



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION I  
475 ALLENDALE ROAD  
KING OF PRUSSIA, PA 19406-1415

August 3, 2011

Mr. David Heacock  
President and Chief Nuclear Officer  
Dominion Resources  
5000 Dominion Boulevard  
Glen Allen, VA 23060-6711

SUBJECT: MILLSTONE POWER STATION - NRC INTEGRATED INSPECTION REPORT  
05000336/2011003 AND 05000423/2011003

Dear Mr. Heacock:

On June 30, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Millstone Power Station Unit 2 and Unit 3. The enclosed inspection report documents the inspection results, which were discussed on August 1, 2011, with Mr. A. J. Jordan and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations, and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

This report documents two NRC-identified findings and two self-revealing findings of very low safety significance (Green). Three of these findings were determined to involve violations of NRC requirements. However, because of the very low safety significance and because they have been entered into your corrective action program (CAP), the NRC is treating these findings as non-cited violations (NCVs) consistent with Section 2.3.2.a of the NRC Enforcement Policy. If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Senior Resident Inspector at Millstone. In addition, if you disagree with the cross-cutting aspect assigned to any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region I, and the NRC Senior Resident Inspector at Millstone.

In accordance with Title 10 of the Code of Federal Regulations (CFR) Part 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document system (ADAMS). ADAMS is accessible from the NRC Web Site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

A handwritten signature in black ink, appearing to read "Donald E. Jackson". The signature is fluid and cursive, with the first name "Donald" being more prominent.

Donald E. Jackson, Chief  
Projects Branch 5  
Division of Reactor Projects

Docket Nos. 50-336, 50-423  
License Nos. DPR-65, NPF-49

Enclosure: Inspection Report No. 05000336/2011003 and 05000423/2011003  
w/ Attachment: Supplemental Information

cc w/encl: Distribution via Listserv

D. Heacock

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Sincerely,

/RA/

Donald E. Jackson, Chief  
Projects Branch 5  
Division of Reactor Projects

Docket Nos. 50-336, 50-423  
License Nos. DPR-65, NPF-49

Enclosure: Inspection Report No. 05000336/2011003 and 05000423/2011003  
w/ Attachment: Supplemental Information

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## U.S. NUCLEAR REGULATORY COMMISSION

## REGION I

Docket No.: 50-336, 50-423

License No.: DPR-65, NPF-49

Report No.: 05000336/2011003 and 05000423/2011003

Licensee: Dominion Nuclear Connecticut, Inc.

Facility: Millstone Power Station, Units 2 and 3

Location: P. O. Box 128  
Waterford, CT 06385

Dates: April 1, 2011 through June 30, 2011

Inspectors: S. Shaffer, Senior Resident Inspector, Division of Reactor Projects (DRP)  
J. Krafty, Resident Inspector, DRP  
B. Haagensen, Resident Inspector, DRP  
M. Modes, Senior Reactor Inspector, Division of Reactor Safety (DRS)  
T. Moslak, Health Physicist, DRS

Approved by: Donald E. Jackson, Chief  
Projects Branch 5  
Division of Reactor Projects

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Table of Contents

SUMMARY OF FINDINGS .....	3
1. REACTOR SAFETY .....	6
1R01 Adverse Weather Protection .....	6
1R04 Equipment Alignment .....	7
1R05 Fire Protection .....	9
1R08 In-Service Inspection .....	10
1R11 Licensed Operator Requalification Program .....	11
1R12 Maintenance Effectiveness .....	12
1R13 Maintenance Risk Assessments and Emergent Work Control .....	12
1R15 Operability Evaluations .....	13
1R18 Plant Modifications .....	16
1R19 Post-Maintenance Testing .....	16
1R20 Refueling and Other Outage Activities .....	18
1R22 Surveillance Testing .....	19
1EP6 Drill Evaluation .....	21
2. RADIATION SAFETY .....	21
2RS01 Radiological Hazard Assessment and Exposure Controls .....	21
2RS02 Occupational ALARA Planning and Controls .....	24
2RS03 In-Plant Airborne Radioactivity Control and Mitigation .....	26
2RS04 Occupational Dose Assessment .....	27
2RS05 Radiation Monitoring Instrumentation .....	28
2RS06 Radioactive Gaseous and Liquid Effluent Treatment .....	30
4. OTHER ACTIVITIES [OA] .....	32
4OA1 Performance Indicator (PI) Verification .....	32
4OA2 Identification and Resolution of Problems .....	32
4OA3 Event Follow-up .....	37
4OA6 Meetings, including Exit .....	42
ATTACHMENT: SUPPLEMENTAL INFORMATION .....	42
SUPPLEMENTAL INFORMATION .....	A-1
KEY POINTS OF CONTACT .....	A-1
LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED .....	A-2
LIST OF DOCUMENTS REVIEWED .....	A-3
LIST OF ACRONYMS .....	A-11

## SUMMARY OF FINDINGS

IR 05000336/2011003, 05000423/2011003; 04/01/2011 - 06/30/2011; Millstone Power Station Unit 2 and Unit 3; Operability Evaluations, Surveillance Testing, Event Follow-up.

The report covered a three-month period of inspection by resident and region-based inspectors. Four Green findings, three of which were non-cited violations (NCV), were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process." The cross-cutting aspects were determined using IMC 0310, "Components Within the Cross Cutting Areas." Findings for which the significance determination process (SDP) does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

### Cornerstone: Initiating Events

Green. A self-revealing finding (FIN) of very low safety significance (Green) was identified for Dominion's failure to follow procedure OP 2204, "Load Changes," when starting the 'A' steam generator feedpump (SGFP). Specifically, the operating crew failed to maintain adequate SGFP suction pressure (greater than 325 psig) while starting the 'A' SGFP, which led to a trip of the 'B' SGFP and subsequent reactor trip on low steam generator level. Dominion entered this issue into their corrective action program (CR431574); conducted training exercises emphasizing safe operating envelopes, critical parameters to monitor, and actions to take to restore margin if plant conditions degrade; and has revised procedure OP 2204.

The finding is more than minor because it is similar to NRC Inspection Manual Chapter 0612, Appendix E, "Examples of Minor Issues," Example 4b; in that, a failure to follow procedure led to a reactor trip. This issue is associated with the Human Performance attribute of the Initiating Events cornerstone and affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the failure of the operators to properly monitor SGFP suction pressure led to a loss of adequate feedwater flow and a reactor trip. The inspectors conducted a Phase 1 screening in accordance with NRC Inspection Manual Chapter (IMC) Attachment 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," and determined that the finding was of very low safety significance (Green) because it did not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions would not be available.

The inspectors determined that this finding had a cross-cutting aspect in the Human Performance cross-cutting area, Work Practices component, because Dominion personnel did not properly follow the load changes procedure. [H.4(b)] (Section 4OA3)

Enclosure

## Cornerstone: Mitigating Systems

Green. The inspectors identified a Green NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," for Dominion's failure to take timely corrective actions for a condition adverse to quality involving the degradation and subsequent through-wall leakage of Unit 3 service water valves 3SWP\*V699 (3HVQ\*ACUS1B Bypass Valve), 3SWP\*V018 (3HVQ\*ACUS2B Unit Cooler Inlet Valve), and 3SWP\*V696 (3HVQ\*ACUS2B Unit Cooler Outlet Valve). Specifically, Dominion did not adequately implement a schedule for prioritizing and completing corrective actions on affected aluminum bronze components, which were known to be susceptible to de-alloying, commensurate with the safety significance of the degraded condition. As a result, through-wall leaks developed on these valves and resulted in unplanned loss of operability and additional unavailability of the safety-related support systems for the 'B' train of containment recirculation spray pumps. Dominion took immediate corrective action to replace the three leaking service water (SW) valves (CR428785).

The inspectors determined that this issue was more than minor because it is similar to the more than minor example, 4.f, of IMC 0612, Appendix E, "Examples of Minor Issues." Specifically, the degraded condition caused a loss of operability of the 'B' train of the containment recirculation spray system. Additionally, the finding was more than minor because it is associated with the Equipment Performance attribute of the Mitigating Systems cornerstone, and adversely affected the cornerstone objective of ensuring the availability of systems that respond to initiating events to prevent undesirable consequences. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," a Phase 1 SDP screening was performed and determined the finding was of very low safety significance (Green) because it was not a design or qualification deficiency, did not represent an actual loss of system safety function of a single train for greater than its Technical Specification allowed outage time, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event.

The finding had a cross-cutting aspect in the Problem Identification and Resolution cross-cutting area, Corrective Action Program component, because Dominion did not ensure that issues potentially impacting nuclear safety were corrected in a timely manner commensurate with their safety significance. Specifically, Dominion failed to adequately implement corrective actions to address a known de-alloying issue with SW valves before the condition led to the unplanned loss of operability and additional unavailability of the safety-related support systems for the 'B' train of containment recirculation spray pumps [P.1(d)]. (Section 1R15)

- Green. The inspectors identified a Green NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," for Dominion's failure to take timely corrective action to address repetitive out of calibration conditions associated with safety-related 120 VAC Unit 2 inverters. To date, Dominion has taken corrective action to adjust the over-frequency and under-frequency transfer limits (CR426589).

The inspectors determined the finding was more than minor because it is similar to the more than minor Example '4f' of NRC Inspection Manual Chapter (IMC) 0612, Appendix E, "Examples of Minor Issues." Additionally, the issue is more than minor because the

Enclosure

performance deficiency can be reasonably viewed as a precursor to a significant event; in that, the history of over- and under-frequency limits drifting out of tolerance could lead to the unavailability of safety-related equipment powered from the inverters. The inspectors conducted a Phase 1 screening in accordance with NRC IMC Attachment 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," and determined that the finding was of very low safety significance (Green) because it was not a design or qualification deficiency, did not represent a loss of system safety function, did not represent an actual loss of safety function of a single train, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event.

The inspectors determined that this finding had a cross-cutting aspect in the Problem Identification and Resolution cross-cutting area, Corrective Action Program component, because Dominion did not take appropriate corrective action in a timely manner to address the repetitive out of calibration conditions with the 120 VAC safety related inverters. [P.1(d)] (Section 1R22)

### **Cornerstone: Barrier Integrity**

- Green. A self-revealing Green NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," was identified for Dominion's failure to take prompt corrective action to address the cause of main steam safety valve (MSSV) exhaust pipe bushings not seating, which resulted in a loss of the Enclosure Building's safety function to control the release of radioactive material. Dominion took corrective action to clean and lubricate the MSSV exhaust pipe and also implemented a modification to upgrade the MSSV outlet boot and qualify it as part of the Enclosure Building filtration boundary (CR420485).

The finding was more than minor because it was associated with the Procedure Quality attribute of the Barrier Integrity cornerstone and affected the cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, the failure of the MSSV sliding bushings to seat properly caused the Enclosure Building Filtration System (EBFS) to fail its surveillance test, and its safety function to control the release of radioactive material could not be assured. The inspectors conducted a Phase 1 screening in accordance with NRC Inspection Manual Chapter (IMC) Attachment 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," and determined that the finding was of very low safety significance (Green) because it only represents a degradation of the radiological barrier function provided for the auxiliary building.

The inspectors determined that this finding had a cross-cutting aspect in the Problem Identification and Resolution cross-cutting area, Corrective Action Program component, because Dominion did not take appropriate corrective action to address the Enclosure Building surveillance test failure in 2009. [P.1(d)] (Section 4OA3)

## REPORT DETAILS

Summary of Plant Status

Millstone Units 2 and 3 began the inspection period operating at 100 percent power. On April 2, 2011, Unit 2 was shutdown to begin refueling outage 2R20. Unit 2 returned to 100 percent power on May 4, 2011. On June 20, 2011, Unit 2 reduced power to 30 percent to repair an oil leak on the 'C' reactor coolant pump (RCP) motor. Following repairs, Unit 2 increased power to approximately 59 percent power when the plant tripped on low steam generator water level. Unit 2 returned to 100 percent power on June 23, 2011. Unit 3 remained at or near 100 percent power for the entire inspection period.

## 1. REACTOR SAFETY

**Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity**1R01 Adverse Weather Protection (71111.01 - 3 samples).1 External Flooding Inspectiona. Inspection Scope

The inspectors evaluated Dominion's readiness to cope with external flooding at Unit 2 and Unit 3. The inspectors reviewed the Unit 2 and Unit 3 Updated Final Safety Analysis Report (UFSAR) and identified areas that could be affected by external flooding due to a design basis flood. The inspectors reviewed applicable procedures to verify that the actions required in the event of flooding could reasonably be completed, and that the appropriate equipment was pre-staged. The inspectors performed walkdowns of the Unit 2 and Unit 3 intake structures, fire pump houses, and inspected the material condition of flood doors in order to determine if the structures and components were being adequately maintained. Documents reviewed during the inspection are listed in the Attachment.

b. Findings

No findings were identified.

.2 Grid Stability - Readiness of Offsite and Alternate AC Power Systemsa. Inspection Scope

The inspectors reviewed Dominion's Independent System Operator (ISO) New England and Connecticut Valley Electric Exchange (CONVEX) procedures for notifications of abnormal grid conditions to determine if they were adequate to ensure the reliability of alternating current (AC) power systems. The inspectors reviewed Dominion's procedures to determine if they addressed inadequate post-trip voltages of the offsite power supply, unknown post trip voltages, reassessment of risk when maintenance activities could affect grid reliability, and required communication between Dominion and

Enclosure

ISO New England/CONVEX when changes at the site could impact the transmission system. The inspectors interviewed selected shift managers to determine if they were familiar with the procedures for abnormal grid conditions. The inspectors performed a walkdown of the switchyard, main transformers, normal station service transformers, and reserve station service transformers; and performed a review of the system health reports for the switchyard and transformers in order to determine the material condition of the offsite power sources.

b. Findings

No findings were identified.

.3 Seasonal Site Inspection

a. Inspection Scope

The inspectors performed a review of Dominion's readiness for hurricane season. The inspectors reviewed selected equipment, instrumentation, and supporting structures to determine if they were configured in accordance with Dominion's procedures, and that adequate controls were in place to ensure functionality of the systems. The inspectors reviewed the Unit 2 and Unit 3 UFSAR and Technical Specifications (TS) and compared the analysis with procedure requirements to ascertain that procedures were consistent with the UFSAR. The inspectors performed partial walkdowns of the Unit 2 and Unit 3 intake structures, fire pump houses, flood doors, and flood protection equipment to determine the material condition of installed flood protection equipment, and verify that the portable flood protection equipment was properly staged. The inspectors also reviewed previous CRs and work orders to verify that the deficiencies identified have been corrected. Documents reviewed during the inspection are listed in the Attachment.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04 - 3 samples)

.1 Partial System Walkdowns

a. Inspection Scope

The inspectors performed three partial system walkdowns during this inspection period. The inspectors reviewed the documents listed in the Attachment to determine the correct system alignment. The inspectors performed a walkdown of each system to determine if the critical portions of the selected systems were correctly aligned, in accordance with the procedures, and to identify any discrepancies that may have had an effect on operability. The walkdowns included selected switch and valve position checks, and verification of electrical power to critical components. Finally, the inspectors evaluated other elements, such as material condition, housekeeping, and component labeling. The

Enclosure

following systems were reviewed based on their risk significance for the given plant configuration:

Unit 2

- Spent Fuel Cooling with the 'A' Low Pressure Safety Injection (LPSI) pump and 'A' Shutdown cooling (SDC) heat exchanger with the core off-loaded in the spent fuel pool on April 13, 2011;
- 'B' High Pressure Safety Injection (HPSI) train while the 'A' train was out of service (OOS) for testing on May 12, 2011; and

Unit 3

- 'A' system HPSI with the 'B' train out for testing on May 5, 2011.

b. Findings

No findings were identified.

.2 Complete System Walkdown (71111.04S – 1 sample)

a. Inspection Scope

The inspectors completed a detailed review of the alignment and condition of Unit 2 EBFS. The inspectors performed a walkdown of the system to determine whether critical portions, such as circuit breakers and switches, were aligned in accordance with procedures and to identify any discrepancies that may have had an adverse effect on operability. The inspectors also reviewed the system health reports, condition reports, and Maintenance Rule evaluations to determine whether equipment problems were being identified and appropriately resolved. Documents reviewed during the inspection are listed in the Attachment.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05Q – 5 samples).1 Fire Protection Toursa. Inspection Scope

The inspectors performed walkdowns of five fire protection areas. The inspectors reviewed Dominion's fire protection program to determine the required fire protection design features, fire area boundaries, and combustible loading requirements for the selected areas. The inspectors walked down these areas to assess Dominion's control of transient combustible material and ignition sources. In addition, the inspectors evaluated the material condition and operational status of fire detection and suppression capabilities, fire barriers, and any related compensatory measures. The inspectors compared the existing conditions of the areas to the fire protection program requirements to determine if all program requirements were being met. Documents reviewed during the inspection are listed in the Attachment. The fire protection areas reviewed included:

Unit 2

- Containment Building, Fire Area C-1;
- West DC Switchgear Room, Fire Area A-21;
- West Battery Room, Fire Area A-23;
- Auxiliary Building, -5' General Area, Fire Area A-1; and

Unit 3

- East Motor Control Center (MCC) and Rod Control Area, Fire Area AB-5.

b. Findings

No findings were identified.

.2 Annual Fire Drill Observation (71111.05A – 1 sample)a. Inspection Scope

To evaluate the readiness of station personnel to fight fires, the inspectors observed Dominion personnel performance during a fire brigade drill on May 13, 2011. The drill simulated a fire in the Unit 2 East Cable Vault in the turbine building. The inspectors observed the fire brigade members using protective clothing, turnout gear, self-contained breathing apparatus and entering the fire area. The inspectors also observed the fire fighting equipment brought to the fire scene to evaluate whether sufficient equipment was available to effectively control and extinguish the simulated fire. The inspectors evaluated whether the permanent plant fire hose lines were capable of reaching the fire area and whether hose usage was adequately simulated. The inspectors observed the fire fighting directions and communications between fire brigade members. The inspectors also evaluated whether the pre-planned drill scenario was followed and

Enclosure

observed the post drill critique to evaluate if the drill objectives were satisfied and that any drill weaknesses were discussed. The inspectors evaluated fire brigade performance, including the readiness of the fire brigade to fight fires and the utilization of preplanned strategies.

b. Findings

No findings were identified.

1R08 In-Service Inspection (71111.08 - 1 sample)

a. Inspection Scope

In-Service Inspection Program

The inspectors reviewed a sample of nondestructive examination activities and discussed the results of the examination with the Dominion corporate Level III In-Service Inspection Inspector. There were no volumetric or surface examinations from the previous outage with relevant indications that were analytically evaluated and accepted by Dominion for continued service.

Vessel Head Inspection

No vessel head activities were performed during this outage.

Welding and Repair Program

The inspectors reviewed a complete welding and fabrication package consisting of a revised piping anchor to determine if the welding activities were performed in accordance with American Society of Mechanical Engineers (ASME) Code requirements, or an NRC approved alternative.

Boric Acid Control Program

The inspectors reviewed the boric acid control program with the Dominion engineering lead. The inspectors reviewed the photographic evidence of boric acid leaks with the Dominion engineering lead and discussed various engineering evaluations performed for boric acid found on Reactor Coolant System (RCS) piping and components. Also, the inspectors verified that degraded or non-conforming conditions are identified properly in Dominion's corrective action program.

Steam Generator (SG) Program

No in-situ pressure testing was performed during this inspection. The inspectors compared the estimated size and number of tube flaws detected during the current outage against the previous outage operational assessment predictions to assess Dominion's prediction capability. The inspectors confirmed that the SG tube eddy current examination scope and expansion criteria meet TS requirements, Electric Power

Enclosure

Research Institute Guidelines, and commitments made to the NRC. The inspectors confirmed all areas of potential degradation (based on site-specific experience and industry experience) are being inspected, especially areas which are known to represent potential eddy current challenges. The inspectors confirmed that the eddy current probes and equipment are qualified for the expected types of tube degradation and assessed the site specific qualification of one or more techniques.

Because Dominion identified loose parts or foreign material on the secondary side of the SG, the inspectors evaluated Dominion's corrective actions. The inspectors confirmed that Dominion has taken/planned appropriate repairs of affected SG tubes, and inspected the secondary side of the SG to remove foreign objects. If the foreign objects are inaccessible, the inspectors determined whether Dominion has performed an evaluation of the potential effects of object migration and/or tube fretting damage. The inspectors reviewed a random sample of eddy current data in this regard.

b. Findings

No findings were identified

1R11 Licensed Operator Regualification Program (71111.11 - 3 samples)

Resident Inspector Quarterly Review (71111.11Q)

a. Inspection Scope

The inspectors observed simulator-based licensed operator requalification training for Unit 2 on May 24, 2011, and June 7, 2011, and for Unit 3 on June 7, 2011. The inspectors evaluated crew performance in the areas of clarity and formality of communications; ability to take timely actions; prioritization, interpretation, and verification of alarms; procedure use; control board manipulations; oversight and direction from supervisors; and command and control. Crew performance in these areas was compared to Dominion management expectations and guidelines as presented in OP-MP-100-1000, "Millstone Operations Guidance and Reference Document." The inspectors compared simulator configurations with actual control board configurations. The inspectors also observed Dominion evaluators discuss identified weaknesses with the crew and/or individual crew members, as appropriate. Documents reviewed during the inspection are listed in the Attachment.

b. Findings

No findings were identified.

Enclosure

1R12 Maintenance Effectiveness (71111.12Q – 1 sample)a. Inspection Scope

The inspectors performed one maintenance effectiveness inspection sample of Dominion's evaluation of degraded conditions for the Unit 2 Charging and Letdown system. The inspectors reviewed Dominion's implementation of the "Maintenance Rule," 10 CFR 50.65. The inspectors reviewed Dominion's ability to identify and address common cause failures; the applicable maintenance rule scoping document for each system; the current classification of these systems in accordance with 10 CFR 50.65 paragraph (a)(1) or (a)(2); and the adequacy of the performance criteria and goals established for each system, as appropriate. The inspectors also reviewed recent system health reports, Condition Reports (CR), apparent cause determinations, functional failure determinations, and discussed system performance with the responsible system engineer. Documents reviewed during the inspection are listed in the Attachment.

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 9 samples)a. Inspection Scope

The inspectors evaluated online risk management for emergent and planned activities. The inspectors reviewed maintenance risk evaluations, work schedules, and control room logs to determine if concurrent planned and emergent maintenance or surveillance activities adversely affected the plant risk already incurred with out-of service (OOS) components. The inspectors evaluated whether Dominion took the necessary steps to control work activities, minimize the probability of initiating events, and maintain the functional capability of mitigating systems. The inspectors assessed Dominion's risk management actions during plant walkdowns. Documents reviewed during the inspection are listed in the Attachment. The inspectors reviewed the conduct and adequacy of risk assessments for the following maintenance and testing activities:

Unit 2

- 2R20 Shutdown Risk Assessment on March 31, 2011;
- Orange Risk for RCS Drain down to Mid-Loop on April 5, 2011;
- Orange Risk for North Bus Outage on April 5, 2011;
- Orange Risk for Replacement of 2 SW-97B (only one train of SW available) on April 7, 2011;
- Risk Mitigation Plan for Isophase Bus Duct Seal Bushing Installation on April 19, 2011;
- Alternate Plant Configuration for Isolating the 'A' Pressurizer Spray Line;
- Yellow Risk for 'A' SW pump OOS and ECCS suction valve testing on May 24, 2011;

Enclosure

Unit 3

- Emergent risk assessment for a failure of the SI logic module in the SSPS train 'B' while switchyard work was in progress on April 18, 2011; and
- Emergent work to replace SW valves 3SWP\*V699, 3SWP\*V018 and 3SWP\*V696 due to de-alloying.

b. Findings

No findings were identified.

1R15 Operability Evaluations (71111.15 – 7 samples)a. Inspection Scope

The inspectors reviewed seven operability determinations (OD). The inspectors evaluated the ODs against the guidance contained in NRC Regulatory Issue Summary 2005-20, Revision to Guidance Formerly Contained in NRC Generic Letter 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability." The inspectors also discussed the conditions with operators, and system and design engineers, as necessary. Documents reviewed during the inspection are listed in the Attachment. The inspectors reviewed the adequacy of the following evaluations of degraded or non-conforming conditions:

Unit 2

- Engineering Technical Evaluation, ETE-MP-2011-0030, addressing a small breach in the control room envelope via a halon piping penetration;
- Engineering Technical Evaluation, ETE-MP-2011-0045, providing use-as-is conclusion on terry turbine shaft pitting;
- ODM 000202, Operation with 2-RS-252, Loop 1A Pressurizer Spray Header Isolation Valve closed;

Unit 3

- RAS 000176 / CR419723, "Fire Shutdown Analysis Time Critical Operator Action (TCOA) to secure RCPs," dated March 28, 2011;
- CR427354, Degraded Condition for MOV 8701B and MOV 8702A RHR Isolations;
- ODM000192, "Addressing Increased Hydrogen Pressure in the VCT Creating an Increase in Unidentified RCS leakage and Increased Leakage From the 'D' RCP #1 Seal Leak-off," dated March 17, 2011; and

Enclosure

- IOD000173, "Initial Operability for Aluminum-Bronze Service Water Valves De-alloying," dated May 25, 2011.

b. Findings

Introduction: The inspectors identified a Green NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," for Dominion's failure to take timely corrective actions for a condition adverse to quality involving the degradation and subsequent through-wall leakage of Unit 3 service water valves 3SWP\*V699 (3HVQ\*ACUS1B Bypass Valve), 3SWP\*V018 (3HVQ\*ACUS2B Unit Cooler Inlet Valve), and 3SWP\*V696 (3HVQ\*ACUS2B Unit Cooler Outlet Valve). Specifically, Dominion did not adequately implement a schedule for prioritizing and completing corrective actions on affected aluminum bronze components, which were known to be susceptible to de-alloying, commensurate with the safety significance of the degraded condition. As a result, through-wall leaks developed on these valves and resulted in unplanned loss of operability and additional unavailability of the safety-related support systems for the 'B' train of containment recirculation spray pumps.

Description: On May 25, 2011, through-wall leaks were identified on SW valves 3SWP\*V699, 3SWP\*V018, and 3SWP\*V696. These valves provide cooling water flow to the room air conditioning units that support the 'B' train of containment recirculation spray pumps. The leaks were caused by de-alloying of the aluminum bronze (Al-Br) valve bodies that had not been properly heat-treated to prevent the galvanic leaching of aluminum from the Al-Br metal matrix. Dominion had previously identified the susceptibility of these service water (SW) valves to de-alloying in apparent cause evaluation (ACE) 017509 dated March 30, 2009. Dominion had identified the de-alloying issue, characterized the de-alloying process, and determined that the cause was due to an old design issue where Al-Br valves had been procured without a specified heat-treatment that would have minimized the susceptibility of the valves to the de-alloying process. Dominion concluded in ACE 017509 that, "Based on past experience, this new valve (3SWP\*V699) will leak 12 to 18 months from installation." Dominion then prioritized all installed SW valves that were susceptible to de-alloying into four tiers based on their susceptibility and risk significance in the extent of condition assessment. Valves 3SWP\*V699, 3SWP\*V018, and 3SWP\*V696 were prioritized as "tier one" and should have been replaced promptly.

Dominion subsequently initiated CR428785 on May 25, 2011, to address through-wall leakage from these SW valves and completed OD000421 to assess operability and extent of condition. The leaking valves were replaced and the air conditioners (3HVQ\*ACUS1B and 3HVQ\*ACUS2B) were returned to service on May 26, 2011. The repeated failure of 3SWP\*V699 and the additional failures of 3SWP\*V018 and 3SWP\*V696 resulted in the loss of operability and additional unavailability of the 'B' train of containment recirculation spray pumps during valve replacement.

Analysis: The inspectors determined that the failure to take timely corrective action following identification of a degraded condition was a performance deficiency that was reasonably within Dominion's ability to foresee and prevent. Traditional Enforcement does not apply because the issue did not have any actual safety consequences or

Enclosure

potential for impacting the NRC's regulatory function, and was not the result of any willful violation of NRC requirements.

The inspectors determined that this issue was more than minor because it is similar to the more than minor example, 4.f, of IMC 0612, Appendix E, "Examples of Minor Issues." Specifically, the degraded condition caused a loss of operability of the 'B' train of the containment recirculation spray system. Additionally, the finding was more than minor because it is associated with the Equipment Performance attribute of the Mitigating Systems cornerstone, and adversely affected the cornerstone objective of ensuring the availability of systems that respond to initiating events to prevent undesirable consequences. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," a Phase 1 SDP screening was performed and determined the finding was of very low safety significance (Green) because it was not a design or qualification deficiency, did not represent an actual loss of system safety function of a single train for greater than its Technical Specification allowed outage time, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event.

The finding had a cross-cutting aspect in the Problem Identification and Resolution cross-cutting area, Corrective Action Program component, because Dominion did not ensure that issues potentially impacting nuclear safety were corrected in a timely manner commensurate with their safety significance. Specifically, Dominion failed to adequately implement corrective actions in a timely fashion to address a known de-alloying issue with SW valves before the condition led to the inoperability and unavailability of the safety-related support systems for the 'B' train of containment recirculation spray pumps [P.1(d)].

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected. Contrary to the above, from March 30, 2009, to May 25, 2011, Dominion did not take timely corrective actions to correct the de-alloying of Al-Br SW valves prior to the condition adversely impacting 'B' containment recirculation spray system operability. Dominion took immediate corrective action to replace the three leaking SW valves. Because the issue is of very low safety significance (Green) and has been entered into Dominion's CAP (CR428785), the NRC is treating this finding as an NCV, consistent with the NRC's Enforcement Policy. **(NCV 05000423/2011003-01, Failure to Take Timely Corrective Actions for De-alloying of Aluminum Bronze Service Water Valves).**

Enclosure

1R18 Plant Modifications (71111.18 – 4 samples)a. Inspection Scope

To assess the adequacy of the modifications, the inspectors performed walkdowns of selected plant systems and components, interviewed plant staff, and reviewed applicable documents, including procedures, calculations, modification packages, engineering evaluations, drawings, corrective action program documents, the UFSAR, and TS.

For the modifications reviewed, the inspectors determined whether selected attributes (component safety classification, energy requirements supplied by supporting systems, seismic qualification, instrument setpoints, uncertainty calculations, electrical coordination, electrical loads analysis, and equipment environmental qualification) were consistent with the design and licensing bases. Design assumptions were reviewed to verify that they were technically appropriate and consistent with the UFSAR. For each modification, the 10 CFR 50.59 screenings or safety evaluations were reviewed. The inspectors also verified that procedures, calculations, and the UFSAR were properly updated with revised design information. In addition, the inspectors verified that the as-built configuration was accurately reflected in the design documentation and that post-modification testing was adequate to ensure the structures, systems, and components would function properly. Documents reviewed during the inspection are listed in the Attachment. The following plant modifications were inspected:

Unit 2

- MP2-10-01037-000, "MP2 Motor Driven AFW Pump Bearing Replacement" (permanent);
- DM2-00-0110-01, "Installation of High Point Vents on H.P & L.P. Safety Injection & Containment Spray Suction Piping" (permanent);
- DM2-03-0183-09, "Temporary DCN Restoration Additional RTB Meter Relay Replacement Anomalies" (permanent); and
- MP2-11-01057, "MP2 MSSV Outlet Boot Design" (permanent).

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 9 samples)a. Inspection Scope

The inspectors reviewed post-maintenance test (PMT) activities to determine whether the PMT adequately demonstrated that the safety-related function of the equipment was satisfied, given the scope of the work specified, and that operability of the system was restored. In addition, the inspectors evaluated the applicable test acceptance criteria to evaluate consistency with the associated design and licensing bases, as well as TS

Enclosure

requirements. The inspectors also evaluated whether conditions adverse to quality were entered into the corrective action program for resolution. Documents reviewed during the inspection are listed in the Attachment. The following maintenance activities and PMTs were evaluated:

#### Unit 2

- SP 2613H, "Facility 2 ESF Integrated Test Data Sheet," Revision 010-02, following replacement of the 'B' Emergency Diesel Generator (EDG) channel heads on April 17, 2011;
- HyPot Testing on the Isophase following the Isophase Duct Seal Plate Installation on April 19, 2011;
- SP 2660-001, "AFP Turbine Overspeed Trip Test," Revision 005-06, on April 21, 2011 and SP2619BS-003, "TDAFP Comprehensive Pump Test (MODE 3)," Revision 001-03, on May 2, 2011 following the overhaul of the Terry Turbine;
- SP 2601C-009, "Chemical and Volume Control System (CVCS) Valve Remote Position Indication IST, Facility 2," Revision 000-00, and SP 2601C-008, "CVCS Valve Stroke and Timing IST, Facility 2," Revision 000-00, following overhaul of 2-CH-514;
- C SP 760-003, "Battery DB3-201D Discharge Inspection," Revision 002-01, following battery replacement on April 10, 2011;
- SP 2610E, "MSIV Closure and Main Steam Valve Operational Readiness Testing," Revision 011-03, following leak injection repair of 2-MS-190B;
- SP 2613-B-001, "Periodic DG Operability Test, Facility 2 (Fast Start, Loaded Run)," Revision 021-05, following 'B' EDG governor replacement;
- SP 2411, "CEA Motion Inhibit Verification," Revision 002-08, following CEAPIDs monitor failure; and

#### Unit 3

- SP 3646A.1-003, "EDG 'A' Air Start Valves Independence Test," Revision 010, and SP 3646A.1-001, "EDG 'A' Operability Tests," Revision 018-01, following repair of a jacket water leak and replacement of the air start filter.

#### b. Findings

No findings were identified.

Enclosure

1R20 Refueling and Other Outage Activities (71111.20 – 1 sample)Millstone Unit 2 Refueling Outage (2R20)a. Inspection Scope

Dominion began refueling outage 2R20 on April 2, 2011, and completed the outage on May 4, 2011. The inspectors evaluated the outage plan and outage activities to determine if Dominion had considered risk, developed risk reduction and plant configuration control methods, considered mitigation strategies in the event of loss of safety functions, and adhered to licensee and TS requirements. The inspectors observed portions of the shutdown, cooldown, heat up, and start up processes. Additionally, the inspectors performed an initial containment Mode 3 walk down to evaluate the as-found condition of containment. The inspectors also performed a final Mode 3 walk down to ensure that no loose material or debris, which could be transported to the containment sump, were present. The inspectors reviewed CRs to determine if conditions adverse to quality were entered for resolution. Documents reviewed for the inspection are listed in the Attachment. Some of the specific activities the inspectors observed and performed included:

- Scaffolding walkdown for potential interference with SSCs;
- Reactor shutdown and cool down;
- Reactor water level drain down to the reactor flange;
- Midloop and reduced inventory operations;
- Fuel handling, core loading, and fuel element assembly tracking;
- Containment as-found walk down;
- Review of outage risk plan;
- Orange Risk – Replacement of service water valve 2SWP-97B;
- Risk Mitigation Plan for the North Bus Outage;
- Generic Letter 88-17 verification;
- Refueling Seal Inspection;
- Containment as-left walk down;
- Reactor Heat-up;
- Reactor Start-up;
- Low Power Physics Testing;
- Reactor power ascension;
- Unit 2 Generator synchronization to the grid;
- Review of Work Schedules for Operations, Maintenance, and Security; and
- Fatigue Management.

b. Findings

No findings were identified.

Enclosure

1R22 Surveillance Testing (71111.22 – 9 samples)a. Inspection Scope

The inspectors reviewed surveillance activities to determine whether the testing adequately demonstrated equipment operational readiness and the ability to perform the intended safety-related function. The inspectors attended pre-job briefings, reviewed selected prerequisites and precautions to determine if they were met, and observed the tests to determine whether they were performed in accordance with the procedural steps. Additionally, the inspectors reviewed the applicable test acceptance criteria to evaluate consistency with associated design bases, licensing bases, and TS requirements, and that the applicable acceptance criteria were satisfied. The inspectors also evaluated whether conditions adverse to quality were entered into the corrective action program for resolution. Documents reviewed during the inspection are listed in the Attachment. The following surveillance activities were evaluated:

Unit 2

- SP 2610E, "MSIV Closure and Main Steam Valve Operational Readiness Testing," Revision 11-02 (IST);
- SP 2730B-001, "Main Steam Safety Valve Testing," Revision 011;
- SP 2613H, "Integrated Test of Facility 2 Components (ICCE)," Revision 012-02;
- SP 2602E-001, "Pressurizer Heater Capacity Test," Revision 000-00;
- SP 2651N-001, "Main Control Valves Operability Test," Revision 002-09;
- PT 21415A, "MP2 Inverters 1-4 Tests," Revision 004-02;

Unit 3

- SP 3622.3, "TDAFW Pump Operational Readiness and Quarterly IST Group 'B' Pump Tests," Revision 017-03;
- SP 3556B12, "SSPS Train 'B' Operational Test," Revision 012-04; and
- CP 3802E, "Reactor Coolant gas Sampling and Analysis," Revision 002-01.

b. Findings

Introduction: The inspectors identified a Green NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," for Dominion's failure to take timely corrective action to address repetitive out of calibration conditions associated with safety-related 120 VAC Unit 2 inverters.

Description: Millstone Unit 2 safety-related inverters 1 through 4 supply power to safety-related 120VAC instrument panels. In April 2011, during refueling outage 2R20, inverters 1 through 4 were found outside the acceptance criteria for the under-frequency and over-frequency transfer limiter test. The over-frequency and under-frequency limits were adjusted back into the acceptance criteria; however, these inverters have had a history of drifting outside their acceptance criteria. In March 2009, the NRC documented an NCV for the inverters being found frequently out of calibration for over-frequency and

Enclosure

under-frequency between 2005 and 2008 (NRC inspection report 05000336&423/2009006). Dominion wrote CR333435 which requested a setpoint change to address the issue identified in the NCV. This request was approved in a Request for Engineering Assistance (REA), but has not been funded to date. Additionally, during the Problem Identification and Resolution team inspection in February 2010, NRC inspectors noted that three of the inverters had over-frequency and under-frequency transfer limits outside acceptance criteria during testing in October 2009, and that corrective action had not been implemented.

Dominion performed an assessment of the system impact of the over- and under-frequency transfer limits and determined that the equipment supplied by the inverters are designed for a wide range of frequencies, and are insensitive to the small frequency band set by the over- and under-frequency transfer limit setpoints. Dominion concluded that the out-of-tolerance over- and under-frequency transfer limits do not present a safety concern and that the inverters remained operable. The inspectors reviewed Dominion's assessment and reached the same conclusion. Dominion's corrective actions will be to perform the detailed analysis necessary to increase the allowable tolerances of the over- and under-frequency setpoints from the current  $\pm 0.1$  Hz.

Analysis: The inspectors determined that the failure to take timely corrective action to address the repetitive out of calibration over-frequency and under-frequency transfer limits was a performance deficiency that was reasonably within Dominion's ability to foresee and correct, and should have been prevented. Traditional enforcement does not apply since there were no actual safety consequences, impacts on the NRC's ability to perform its regulatory function, or willful aspects of the finding.

The inspectors determined the finding was more than minor because it is similar to the more than minor Example '4f' of NRC Inspection Manual Chapter (IMC) 0612, Appendix E, "Examples of Minor Issues." Additionally, the issue is more than minor because the performance deficiency can be reasonably viewed as a precursor to a significant event; in that, the history of over- and under-frequency limits drifting out of tolerance could lead to the unavailability of safety-related equipment powered from the inverters. The inspectors conducted a Phase 1 screening in accordance with NRC IMC Attachment 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," and determined that the finding was of very low safety significance (Green) because it was not a design or qualification deficiency, did not represent a loss of system safety function, did not represent an actual loss of safety function of a single train, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event.

The inspectors determined that this finding had a cross-cutting aspect in the Problem Identification and Resolution cross-cutting area, Corrective Action Program component, because Dominion did not take appropriate corrective action in a timely manner to address the repetitive out of calibration conditions with the 120 VAC safety related inverters. [P.1(d)]

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," states, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, and defective material and equipment,

Enclosure

and nonconformances are promptly identified and corrected. Contrary to the above, from March 2009, until June 2011, Dominion failed to take timely corrective action to address the repetitive out of calibration conditions associated with the 120 VAC safety related inverters. To date, Dominion has taken corrective action to adjust the over-frequency and under-frequency transfer limits. Because this violation was of very low safety significance and was entered into Dominion's corrective action program (CR426589), this violation is being treated as an NCV, consistent with the NRC's Enforcement Policy. **(NCV 0500336/2011003-02 Untimely Corrective Action for Safety Related Inverters Leads to Repetitive Out of Calibration Results)**

**Cornerstone: Emergency Preparedness (EP)**

1EP6 Drill Evaluation (71114.06 - 1 sample)

Classification and Notification during Requalification Training

a. Inspection Scope

The inspectors reviewed the operator's emergency classification and notification completed during Unit 2's requalification training on June 7, 2011. The inspectors verified the classification and notification were accurate and timely.

b. Findings

No findings were identified.

**2. RADIATION SAFETY**

**Cornerstone: Public and Occupational Radiation Safety**

2RS01 Radiological Hazard Assessment and Exposure Controls (71124.01)

a. Inspection Scope (1 sample)

During the period April 18, 2011 through April 21, 2011, the inspectors performed the following activities to verify that Dominion was evaluating, monitoring, and controlling radiological hazards for work performed during the 2R20 refueling outage in locked high radiation areas (LHRA) and other radiological controlled areas. Implementation of these controls was reviewed against the criteria contained in 10 CFR Part 20, Technical Specifications, and with Dominion's procedures.

Radiological Hazards Control and Work Coverage

The inspectors identified work performed in radiological controlled areas in Unit 2 and evaluated Dominion's assessment of the radiological hazards. The inspectors evaluated the survey maps, exposure control evaluations, electronic dosimeter dose/dose rate alarm set points, and radiation work permits (RWP) associated with these areas to determine if the exposure controls were acceptable. Specific work activities evaluated

Enclosure

included inspection/removal of a damaged incore instrument (ICI) thimble tube (RWP 391) from the ICI plate and reinstalling the ICI plate and Upper Guide Structure (UGS) in the reactor vessel (RWP 302). For these tasks, the inspectors attended the pre-job briefings and discussed the job assignments with the workers. The inspectors also observed (from the centralized monitoring system and during containment tours), the implementation of exposure controls for disassembling/removing scaffolding from containment (RWP 331), re-installing insulation (RWP 326), and demobilization of SG tasks (RWP 307).

The inspectors reviewed the air sample records for samples taken prior to installing SG nozzle dams to determine if the samples collected were representative of the breathing air zone and analyzed/recorded in accordance with established procedures. During tours of the Unit 2 containment building, the inspectors verified that continuous air monitors were strategically located to assure that potential airborne contamination could be timely identified and that the monitors were located in low background areas.

The inspectors toured accessible radiologically controlled areas (RCA) in the Unit 2 containment and with the assistance of a radiation protection technician, performed independent radiation surveys of selected areas to confirm the accuracy of survey data, and the adequacy of postings. Radiation protection technicians were questioned regarding their knowledge of plant radiological conditions for selected jobs, and the associated controls.

Additionally, the inspectors reviewed the RWPs developed for other work performed during 2R20 including installation of permanent shielding and diving operations. In particular, the inspectors reviewed the electronic dosimeter dose/dose rate alarm set points, stated on the RWP, to determine if the setpoints were consistent with the survey indications and plant policy.

#### Instructions to Workers

By attending pre-job briefings, the inspectors determined that workers performing radiological significant tasks were properly informed of electronic dosimeter alarm setpoints, low dose waiting areas, stay times, and work site radiological conditions. By observing work-in-progress, the inspectors determined that stay times were appropriately monitored by supervision to assure no procedural limit was exceeded. Jobs observed included inspection of a damaged ICI thimble tube and preparations for moving the UGS.

During tours of containment, the inspectors determined that LHRA and a very high radiation area (VHRA) had the appropriate warning signs and were secured. Additionally, the inspectors identified that low dose waiting areas were appropriately surveyed, identified, and used by personnel.

The inspectors inventoried the keys to LHRAs to determine if the keys were appropriately controlled, as required by procedure. The inspectors discussed with radiation protection supervision the procedural controls for accessing LHRAs and VHRAs and determined that no changes have been made to reduce the effectiveness and level of worker protection.

#### Contamination and Radioactive Material Control

During tours of containment, the inspectors confirmed that contaminated materials were properly bagged, surveyed/labeled and segregated from work areas. The inspectors observed workers using contamination monitors to determine if various tools/equipment were potentially contaminated and met criteria for releasing the materials from the RCA.

#### Radiological Hazards Control and Work Coverage

By observing preparations for inspecting/removing a damaged ICI thimble tube, the inspectors determined that workers wore the appropriate protective equipment, had dosimetry properly located on their bodies, and were under the positive control of radiation protection personnel. Clear radio communication was established between the workers and the centralized monitoring system. Stay times were properly measured and supervisory personnel controlled the movements of the workers to assure that exposure was minimized.

#### Radiation Worker Performance

During job performance observations, the inspectors determined that workers complied with RWP requirements and were aware of radiological conditions at the work site. Additionally, the inspectors determined that radiation protection technicians were aware of RWP controls/limits applied to various tasks and provided positive control of workers to reduce the potential of unplanned exposure and personnel contaminations.

#### Problem Identification and Resolution

A review of Nuclear Oversight field observation (2R20 outage snapshots) reports, dose/dose rate alarm reports, personnel contamination event reports and associated CRs, were conducted to determine if identified problems and negative performance trends were entered into Dominion's CAP and evaluated for resolution and to determine if an observable pattern traceable to a similar cause was evident.

Relevant CRs, associated with radiation protection control access and radiological hazard assessment, initiated between January 2011 and March 2011, were reviewed and discussed with Dominion staff to determine if the follow up activities were being conducted in an effective and timely manner, commensurate with their safety significance.

b. Findings

No findings were identified.

2RS02 Occupational ALARA Planning and Controls (71124.02)

a. Inspection Scope (1 sample)

During the period April 18, 2011 through April 21, 2011, the inspectors performed the following activities to verify that Dominion was properly implementing operational, engineering, and administrative controls to maintain personnel exposure as low as reasonably achievable (ALARA) for tasks performed during the Unit 2 refueling outage 2R20. Implementation of this program was reviewed against the criteria contained in 10 CFR Part 20, applicable industry standards, and with Dominion's procedures.

Radiological Work Planning

The inspectors reviewed pertinent information regarding site cumulative exposure history, current exposure trends, and exposure challenges for the Unit 2 outage. The inspectors reviewed various 2R20 Outage ALARA Plans.

The inspectors reviewed the exposure status for tasks performed during the Unit 2 outage and compared actual exposure with forecasted estimates contained in various project ALARA Plans (AP). In particular, the inspectors evaluated the effectiveness of ALARA controls for all jobs that were estimated to exceed the 5 person rem limit. These jobs included reactor vessel disassembly/reassembly (AP 2-11-01), SG inspections/maintenance (AP 2-11-09), scaffolding installation/removal (AP 2-11-13), insulation removal/installation (AP 2-11-14), and radiation protection support activities (AP 2-11-26).

The inspectors reviewed the Work-In-Progress ALARA reviews for those jobs whose actual dose approached the forecasted estimate. The inspectors evaluated the departmental interfaces between radiation protection, operations, maintenance crafts, and engineering to identify missing ALARA program elements and interface problems. The evaluation was accomplished by interviewing site staff, reviewing outage Work-in-Progress reviews, and reviewing recent Station ALARA Council (SAC) meeting minutes. Included was a review of the exposure controls for the 'C' reactor coolant pump (RCP) motor and seal replacement, and scaffolding installation.

Verification of Dose Estimates

The inspectors reviewed the assumptions and basis for the 2R20 outage ALARA forecasted exposure. The inspectors also reviewed the revisions made to various outage project dose estimates due to a reduced source term (i.e., lower dose rates); e.g., reactor disassembly/reassembly activities, reactor coolant pump maintenance, and SG maintenance.

Enclosure

The inspectors evaluated the implementation of Dominion procedures associated with monitoring and re-evaluating dose estimates and allocations when the forecasted cumulative exposure for tasks exceeded the actual exposure. Included in the review were Work-In-Progress reports, that evaluated the effectiveness of ALARA measures, including source term controls, and actions by the SAC to subsequently lower dose goals from the original estimates.

Additionally, the inspectors reviewed the exposures for the ten workers receiving the highest doses for 2011 to confirm that no individual exceeded the regulatory limits or performance indicator thresholds.

#### Source Term Reduction and Control

The inspectors reviewed the status and historical trends for the Unit 2 source term. Through review of survey maps and interviews with the Radiation Protection Manager, the inspectors evaluated recent source term measurements and control strategies. Specific strategies being employed included use of macro-porous clean up resin, enhanced operational chemistry controls, and installation of permanent/temporary shielding.

The inspectors reviewed the effectiveness of temporary shielding by reviewing pre/post-installation radiation surveys for selected components having elevated dose rates. Shielding packages reviewed included those placed on the reactor head stand, pressurizer spray piping, SG penetrations, and RCP piping.

#### Job Site Inspections

During plant tours, the inspectors assessed the implementation of ALARA controls specified in ALARA Plans and RWPs, for ICI thimble tube cutting/removal, RCP maintenance, and SG tube inspections, performed during 2R20.

The inspectors also observed workers performing SG demobilization from eddy current testing, ICI inspections, and scaffolding removal. Workers were questioned regarding their knowledge of job site radiological conditions and ALARA measures applied to their tasks.

#### Problem Identification and Resolution

The inspectors reviewed elements of Dominion's CAP related to implementing the ALARA program to determine if problems were being entered into the program for timely resolution, the comprehensiveness of the cause evaluation, and the effectiveness of the corrective actions. Specifically, CRs related to programmatic dose challenges, personnel contaminations, dose/dose rate alarms, and the effectiveness in predicting and controlling worker exposure were reviewed.

Enclosure

b. Findings

No findings were identified.

2RS03 In-Plant Airborne Radioactivity Control and Mitigation (71124.03)

a. Inspection Scope (1 sample)

During the period April 18, 2011 through April 21, 2011, the inspectors performed the following activities to verify that in-plant airborne concentrations of radioactive materials are being controlled and monitored, and to verify that respiratory protection devices are properly selected and used by qualified personnel. Implementation of these programs was evaluated against the criteria contained in 10 CFR Part 20, applicable industry standards, and with Dominion's procedures.

Engineering Controls

The inspectors evaluated the use of portable continuous air monitors (AMS-4) and portable HEPA ventilation systems installed in containment during the 2R20 outage. The inspectors determined that the monitors were located at work locations; e.g., SG primary side openings, in containment where airborne contamination could potentially occur. The inspectors reviewed testing records for portable HEPA ventilation systems to determine that procedural performance criteria were met.

Respiratory Protection

The inspectors reviewed the use of respiratory protection devices worn by workers. The inspectors reviewed air sampling records, SG channel head removable contamination data, RWPs, and Total Effective Dose Equivalent (TEDE) ALARA DAC evaluations to determine if the use of respiratory protection devices was commensurate with the potential external dose that may be received when wearing these devices.

Problem Identification and Resolution

The inspectors reviewed elements of Dominion's CAP related to implementing the airborne monitoring program to determine if problems were being entered into the program for timely resolution, the comprehensiveness of the cause evaluation, and the effectiveness of the corrective actions. Specifically, CRs related to monitoring challenges, personnel contaminations, dose assessments, and the reliability of monitoring equipment were reviewed.

b. Findings

No findings were identified.

## 2RS04 Occupational Dose Assessment (71124.04)

### a. Inspection Scope (1 sample)

During the period April 18, 2011 through April 21, 2011, the inspectors performed the following activities to verify the accuracy and operability of personal monitoring equipment and the effectiveness in determining a worker's TEDE. Implementation of these programs was evaluated against the criteria contained in 10 CFR Part 20, applicable industry standards, and with Dominion's procedures.

### External Dosimetry

The inspectors verified that Dominion's dosimetry processor was accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). The inspectors verified that the approved dosimeter irradiation categories were consistent with the types and energies of the site's source term. The inspectors reviewed Dominion's audit of the dosimetry processor and the areas identified for improvement contained in the report.

The inspectors confirmed that Dominion has developed "correction factors" to address the response differences of electronic dosimeters as compared to thermoluminescent dosimeters (TLD).

### Internal Dosimetry

The inspectors evaluated the equipment and methods used to assess worker dose resulting from the uptake of radioactive materials. Included in this review were bioassay procedures, whole body counting equipment (FastScan, AccuScan, portal contamination monitors) calibration checks and operating procedures, and the analytical results for 10 CFR Part 61 samples.

The inspectors determined that the procedural methods include techniques to distinguish internally deposited radioisotopes from external contamination, methods to assess dose from hard-to-measure radioisotopes, and methods to distinguish ingestion pathways from inhalation pathways.

The inspectors reviewed the results from three whole body counts to assess the adequacy of the counting time, background radiation contribution, and the nuclide library used for assessing deposition. No individual exposure exceeded a committed effective dose equivalent (CEDE) of 10 mrem.

### Declared Pregnant Workers

The inspectors reviewed the procedural controls, and associated records, for managing declared pregnant workers (DPW) and determined that three DPWs were employed during the Unit 2 outage. The inspectors reviewed the individual exposure results and monitoring controls to assure compliance with 10 CFR Part 20.

Enclosure

### Multi-Dosimetry Methods

The inspectors reviewed Dominion's procedures for monitoring external dose where significant dose gradients exist at the work site. For 2R20, multi-dosimetry methods were used, instead of external effective dose equivalent (EDEX) methods. The inspectors reviewed the dosimetric results for jobs where workers wore multiple dosimeters. These jobs included SG nozzle installations, fuel transfer equipment repair, and diving operations. The inspectors confirmed that in addition to the TLDs worn, workers also wore electronic dosimeters, equipped with telemetry, to assure that dose fields were promptly monitored by radiation protection technicians in the centralized monitoring station.

### Problem Identification and Resolution

The inspectors reviewed elements of Dominion's CAP related to implementing the dosimetry program to determine if problems were being entered into the program for timely resolution, the comprehensiveness of the cause evaluation, and the effectiveness of the corrective actions. Specifically, CR related to dose assessments, personnel contaminations, and dose/dose rate alarms were reviewed.

#### b. Findings

No findings were identified.

### 2RS05 Radiation Monitoring Instrumentation (71124.05 - 1 sample)

#### a. Inspection Scope (1 sample)

During the period May 23, 2011 through May 26, 2011, the inspectors performed the following activities to evaluate the operability and accuracy of radiation monitoring instrumentation used to detect and quantify effluent releases. Implementation of these programs was reviewed against the criteria contained in 10 CFR Part 20, applicable industry standards, and with Dominion's procedures.

### Walk-down of Effluent Monitoring Systems

The inspectors walked down selected portions of the liquid and gaseous monitoring systems installed in Unit 2 and Unit 3 to assess material condition, observe maintenance/calibration activities, and determine the status of system upgrades.

In Unit 2, the walkdown included portions of the following monitors:

### Gaseous Effluent Monitors

- Enclosure Building Roof Vent Monitor, RM-8132 A/B
- Fuel Handling Building Exhaust, RM-8145
- Radwaste Building Exhaust, RM-8997
- Auxiliary Building Exhaust, RM-8434

Enclosure

- Stack Monitor – Wide Range, RM-8169
- Waste Gas Tank Monitor, RM-9095
- Steam Jet Air Ejector Monitor, RM-5099

#### Liquid Effluent Monitors

- Clean Liquid Waste Effluent Monitor, RM-9049
- Aerated Liquid Waste Effluent Monitor, RM-9116
- Steam Generator Blow-down Monitor, RM-4262
- Condensate Receiving Tank Monitor, RM-9327
- Reactor Building Component Cooling Water Monitor, RM-6038

In Unit 3, the walkdown included portions of the following monitors:

#### Gaseous Effluent Monitors

- Ventilation Vent Monitor, RE-10A/B
- Supplemental Leak Collection and Release System (SLCRS) Monitor, RE 19A/B
- Engineered Safeguards Building Monitor, RE-49

#### Liquid Effluent Monitors

- Turbine Building Sump Monitor, RE-50
- Liquid Waste Effluent Monitor, RE-70
- Waste Neutralization Sump Monitor, RE-07

#### Calibration and Testing Program

Through record reviews, the inspectors confirmed that the effluent monitoring instruments were properly calibrated, and that the required source checks and functional tests had been routinely performed. The inspectors verified that the effluent monitor alarm set points are established in accordance with the Off Site Dose Calculation Manual (ODCM).

The inspectors reviewed contamination sampling results (per 10 CFR Part 61) used to characterize difficult-to-measure radioisotopes, to determine if the calibration sources were representative of the radioisotopes found in the plant's source term.

#### Problem Identification and Resolution

The inspectors reviewed selected CRs, system health reports, and various Nuclear Quality Assurance reports to evaluate Dominion's threshold for identifying, evaluating, and resolving problems for the radiation monitoring instrumentation. Included in this review were CRs related to radiation worker and radiation protection technician errors to determine if an observable pattern traceable in the maintenance or use of radiation instruments was evident.

Enclosure

b. Findings

No findings were identified.

2RS06 Radioactive Gaseous and Liquid Effluent Treatment (71124.06 - 1 sample)

a. Inspection Scope (1 sample)

During the period May 23, 2011 through May 26, 2011, the inspectors performed the following activities to verify that Dominion was properly maintaining the gaseous and liquid effluent processing systems to ensure that radiological releases were properly mitigated, monitored, and evaluated with respect to public exposure. Implementation of these controls was reviewed against the criteria contained in the 10 CFR Parts 20 and 50, of Dominion's Radiological Effluent Monitoring and Offsite Dose Calculation Manual (REMODOCM), and with Dominion's procedures.

Effluent Report Reviews

The inspectors reviewed the 2009 and 2010 Annual Radiological Effluent Release Reports to verify that the effluents program was implemented as required by the REMODOCM. Included in this review were the results of the ground water protection program, the inclusion of Carbon-14 dose contributions, the current land use census, and verification that no significant changes were made to the Unit 2 and Unit 3 gaseous and liquid release system configurations, as specified in the Final Safety Analysis Report (FSAR) and ODCM descriptions.

Walkdowns and Observations

The inspectors walked down the major components of the Unit 2 and Unit 3 gaseous and liquid release systems, to verify the system configurations complied with the FSAR description, and to evaluate equipment material condition.

The inspectors reviewed the most current Unit 2 and Unit 3 liquid and gaseous effluent monitor monthly source checks, quarterly functional test results and 18-month calibration records to verify that instrumentation and associated pumps/isolation valves or fans/isolation dampers, respectively, were operable.

The inspectors reviewed the air cleaning systems surveillance test results for the HEPA and charcoal filtration systems installed in Unit 2 and Unit 3. The inspectors confirmed that the air flow rates were consistent with the FSAR values and the filtration system met the acceptance criteria.

Sampling and Analysis

The inspectors reviewed the relevant surveillance procedures (SP) and observed technicians collecting weekly air particulate and iodine samples. Airborne particulate and iodine samples were taken from the Main Station Stack monitor (RM-8169), using

Enclosure

SP-2815. Samples were taken from the Unit 2 Enclosure Building roof vent monitor (RM-8132), using SP-2814A.

During the walkdowns of effluent monitoring systems, the inspectors determined that appropriate compensatory sampling measures were implemented for monitors that were removed from service for maintenance or calibration. Compensatory measures were in place for the U-2 Ventilation Vent monitor (RM-8132), Unit 3 SCLRS monitor (HVR-19), and Unit 3 Liquid Waste monitor (LWS-RE-70).

The inspectors reviewed the results of Dominion's inter-laboratory comparison (blind sample) program to verify the accuracy of effluent sample analysis performed by Dominion.

#### Dose Calculations

The inspectors reviewed monthly, quarterly, and annual dose projections for liquid and gaseous effluents performed during the past 12 months to verify that the effluent was processed and released in accordance with REMODCM requirements and to ensure that the licensee properly calculated the offsite dose from effluent releases. The inspectors confirmed that no performance indicator (criteria contained in Appendix I to 10 CFR 50) was exceeded for these releases.

The inspectors reviewed liquid discharge permits for Unit 2 and Unit 3 to evaluate the adequacy of dilution flow, radioactive content, and overall accuracy of the documented data.

#### Ground Water Protection Program

The inspectors verified that Dominion is continuing to implement the voluntary Nuclear Energy Institute/Industry Ground Water Protection Initiative. The inspectors reviewed monitoring well sample results, trending data, and decommissioning records (maintained per 10 CFR 50.75 (g)) to evaluate procedural compliance and to identify off normal results.

#### Problem Identification and Resolution

The inspectors reviewed selected CRs, system health reports, and Nuclear Quality Assurance audits to evaluate Dominion's threshold for identifying, evaluating, and resolving problems regarding effluent treatment and monitoring.

b. Findings

No findings were identified.

4. **OTHER ACTIVITIES [OA]**4OA1 Performance Indicator (PI) Verification (71151 – 6 samples)Cornerstone: Initiating Eventsa. Inspection Scope

The inspectors reviewed Dominion submittals for the PIs listed below to verify the accuracy of the data reported during that period. The PI definitions and guidance contained in Nuclear Energy Institute (NEI) 99-02, "Regulatory Assessment Indicator Guideline," Revision 5, were used to verify the basis for reporting each data element. The inspectors reviewed portions of the operations logs, monthly operating reports, and Licensee Event Reports (LER) and discussed the methods for compiling and reporting the PIs with cognizant licensing and engineering personnel.

Unit 2

- Unplanned Scrams per 7000 Critical Hours;
- Unplanned Scrams with Complications;
- Unplanned Transients per 7000 Critical Hours;

Unit 3

- Unplanned Scrams per 7000 Critical Hours;
- Unplanned Scrams with Complications; and
- Unplanned Transients per 7000 Critical Hours.

b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems (71152).1 Review of Items Entered into the Corrective Action Programa. Inspection Scope

As required by Inspection Procedure 71152, "Identification and Resolution of Problems," and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into Dominion's corrective action program. This was accomplished by reviewing the

Enclosure

description of each new CR and attending daily management review committee meetings.

b. Findings

No findings were identified.

.2 Annual Sample: Assessment of Current Performance in the Cross-Cutting Aspect H.1(b)

a. Inspection Scope (1 sample)

The inspectors reviewed Dominion's current performance relevant to the cross-cutting aspect, [H.1 (b)] Human Performance, Decision Making. Licensee Decisions demonstrate that nuclear safety is an overriding priority, and Dominion uses conservative assumptions in decision making and adopts a requirement to demonstrate that the proposed action is safe in order to proceed, rather than a requirement to demonstrate that it is unsafe in order to disapprove the action. Dominion conducts effectiveness reviews of safety-significant decisions to verify the validity of the underlying assumptions, identifies possible unintended consequences, and determines how to improve future decisions. Millstone was noted to have three ROP findings with this associated cross-cutting aspect in the last assessment period. The inspectors reviewed related CRs, interviewed staff personnel, conducted behavioral observations of staff interactions during several meetings and training sessions, and developed a case study of Dominion's response to the Unit 2 reactor trip on June 20, 2011.

b. Findings and Observations

No findings were identified.

The inspectors determined that Dominion had identified the trend in the cross-cutting aspect [H.1(b)] in their CAP (CR403111). Dominion had conducted a common cause evaluation of the cross-cutting area [H.1(b)] (CCE000164) and concluded that "no common cause, most prevalent cause related to Conservative Assumptions and Safe Actions was derived from the review of these three events." The inspectors noted that, at the end of the current quarter, Dominion will have only one finding with a cross-cutting aspect [H.1(b)] in this reporting period because two of the findings are no longer current and no additional findings have assigned [H.1(b)] as a cross-cutting aspect. The inspectors reviewed CCE000164 and noted that this evaluation was somewhat narrowly focused on the three individual findings. While Dominion concluded that there was no common cause, they broadened the scope of this evaluation and determined there was a common theme across the three events that included some aspect of inadequate worker knowledge and appropriate risk recognition. They subsequently addressed this common theme by implementing corrective actions for the three findings (CA170523, CA183044 and CA191587) by conducting training on the specific issues.

The inspectors followed Dominion's response to the Unit 2 reactor trip that occurred on June 20, 2011, as a real time case study in the effectiveness of the Millstone conservative decision making process. Dominion immediately prepared CRs that

Enclosure

addressed the human performance errors (CR431574 RCE), procedural issues (CR431722) and simulator fidelity issues (CR432012) and is presently conducting a root cause evaluation (RCE) of the event. Prior to restarting the reactor, the inspectors observed a management meeting to implement procedural changes prior to restart, just-in-time training (JITT) for the crew supporting the restart, and the lessons learned training on critical parameter monitoring (CR431936) conducted after the event for the remediation of all shifts. These activities observed in this case study demonstrated an appropriate emphasis on conservative decision making, critical parameter monitoring by operators and a focus on operator fundamentals. In addition, the inspectors observed Supervisor Leadership Training conducted by the Plant Manager that reemphasized the safety culture aspects, expectations and responsibilities of front line supervisors. This included lessons learned from the response to this event. Based on this sample, it appears that Dominion has recognized the implications of the trend in the cross-cutting aspect [H.1(b)]. Current efforts to address this aspect are in progress within the Dominion CAP and will be assessed in the future after the RCE has been completed, and when lessons learned and corrective actions to prevent recurrence have been formulated and implemented.

3. Annual Sample: Assessment of Current Performance in the Cross Cutting Aspect P.1[a]

a. Inspection Scope (1 sample)

The inspectors reviewed Dominion's current performance relevant to the cross-cutting aspect [P.1(a)]: Problem Identification and Resolution, Corrective Action Program. Dominion ensures that issues potentially impacting nuclear safety are promptly identified, fully evaluated, and that actions are taken to address safety issues in a timely manner, commensurate with their significance. Dominion implements their CAP with a low threshold for identifying issues. Dominion identifies such issues completely, accurately, and in a timely manner commensurate with their safety significance. At the end of the last ROP assessment period, Dominion was noted to have three ROP findings with this associated cross-cutting aspect and at the end of the current quarter. Dominion will continue to have the same three findings with a cross-cutting aspect [P.1(a)] in this assessment period because no additional findings have been added and the three original findings occurred within the past four quarters. The inspectors reviewed related CRs, interviewed staff personnel, conducted behavioral observations of staff interactions during several meetings and training sessions, and developed a case study of Dominion's response to the Unit 2 reactor trip on June 20, 2011.

b. Findings and Observations

No findings were identified.

The inspectors assessed Dominion's response to the area of identifying, fully evaluating and addressing safety issues in a timely manner. The inspectors determined that

Dominion had identified a trend in the safety culture cross-cutting aspect [P.1(a)] and had concluded that the three ROP findings had been properly evaluated and closed individually. Dominion did not perform a common cause assessment for the cross-cutting aspect [P.1(a)]. During this ROP inspection period, no additional findings were identified that involved [P.1(a)].

Interviews with Dominion managers indicated that Millstone was planning to further address the broader issue of corrective action program effectiveness by making improvements to their CAP including improving the quality of their apparent cause evaluations (ACE) and root cause evaluations (RCE); strengthening the effectiveness of the Corrective Action Review Board (CARB); initiating CRs for all rejected ACEs and RCEs; and enhancing the minimum required qualifications and training for CARB members. They also were planning to conduct a sampling of lower level CR evaluations to determine if they were missing key trends and reducing the extension of corrective action due dates. Other corrective actions will be considered based on the results of the common cause assessment for this trend that is presently in progress. The inspectors noted that Millstone staff initiates a substantial volume of CRs every year and the threshold for preparing a CR appeared to be appropriately low. There appeared to be little reluctance to drafting a CR by the vast majority of the staff at Millstone.

The inspectors followed Dominion's response to the Unit 2 reactor trip that occurred on June 20, 2011, as a real time case study in the effectiveness of the Millstone corrective action process. Dominion immediately prepared CRs that addressed the human performance errors (CR431574 RCE), procedural issues (CR431722) and simulator fidelity issues CR432012, and is presently conducting a RCE of the event. Prior to restarting the reactor, the inspectors observed a management meeting to implement procedural changes prior to restart, just-in-time training (JITT) for the crew supporting the restart, and the lessons learned training on critical parameter monitoring conducted after the event for all shifts. These activities demonstrated an appropriate threshold of problem identification, an ability to promptly resolve adverse conditions and effective corrective action implementation in response to this event. In addition, the inspectors observed Supervisor Leadership Training conducted by the Plant Manager that reemphasized the safety culture aspects, expectations and responsibilities of front line supervisors that included lessons learned from the response to this event. Based on this sample, it appears that Dominion has recognized the implications of the cross-cutting theme [P.1(a)]. Current efforts to address this theme are in progress and will be assessed in the future after the RCE has been completed and corrective actions to prevent recurrence have been implemented.

#### .4 Semi-Annual Problem Identification & Resolution (PI&R) Trend Review

##### a. Inspection Scope (1 sample)

The semi-annual trend review's focus was to determine Dominion's progress in correcting negative trends. The inspectors reviewed Dominion's corrective action trend report for the 3<sup>rd</sup> quarter 2010 and selected the work management trends for review. Work management was selected because it has been a site focus area for over a year. The inspectors reviewed corrective action assignments CA173666, CA177780,

Enclosure

CA177781, and all corrective action assignments from apparent cause ACE 018411. The inspectors reviewed the trends and interviewed several maintenance and planning personnel in order to determine if the corrective action assignment matched the issue and if the corrective actions completely addressed the issue.

b. Assessments and Observations

No findings were identified.

The overall goal of the corrective actions was to address negative trends in meeting work management milestones, work order readiness, and backlog management. The inspectors determined that since February 2011, overall work management has been improving. Total backlog per unit has been reduced from 3946 to 3771 between February and May 2011. Critical and non critical PMs deferred per rolling quarter have dropped from 24 and 23 respectively in July 2010, to 6 and 0 in May 2011. T4 scope stability has been consistently at approximately 90 percent for several months. Dominion has started looking out to T16 to determine if overtime or contractor use will be required to complete the necessary work. Not all trends have been positive, as annualized critical and non critical PMs performed late in the grace period have steadily increased from 24 percent and 26.5 percent respectively in July 2010, to 31.6 percent and 34.3 percent in May 2011.

The inspectors identified that one corrective action was closed out before the work was completed. CA173666 was to evaluate the gap to excellence in schedule adherence. The work completed was a draft plan to efficiently use resources to plan and complete work. The draft plan has several tasks to implement other plans. The assignment was closed out without any documentation that the plan had been implemented. It appears that the plan is being implemented, but the details are not captured under that corrective action. There was one corrective action that the inspectors could not completely verify its completion. CA185790's assignment was to address work orders removed from the schedule because they did not meet the milestones. This assignment was closed primarily because of T4 scope stability and implementation week adherence greater than 90 percent.

4OA3 Event Follow-up (71153 – 2 samples).1 (Closed) LER 05000336/2011-001 Enclosure Building Rendered Inoperable Due to Dislodged Bushingsa. Inspection Scope

On April 3, 2011, Millstone Unit 2 Enclosure Building Filtration System (EBFS) negative pressure test results failed to meet acceptance criteria while the unit was in Mode 4, making the Enclosure Building inoperable. Since the Enclosure Building failed its surveillance test, its safety function to control the release of radioactive material could not be assured. Dominion determined that the cause for the failure was that the sliding bushings on the main steam safety valve (MSSV) exhaust piping had become stuck and were not seated properly.

b. Findings

Introduction: A self-revealing Green NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," was identified for Dominion's failure to take prompt corrective action to address the cause of MSSV exhaust pipe bushings not seating, which resulted in a loss of the Enclosure Building's safety function to control the release of radioactive material. Dominion has since cleaned and lubricated the MSSV exhaust pipe, and also implemented a modification to upgrade the MSSV outlet boot and qualify it as part of the Enclosure Building filtration boundary.

Description: On April 3, 2011, Millstone Unit 2 was performing a plant cool-down in Mode 5 when the data taken on the EBFS test while in Mode 4 indicated that it had not met its acceptance criteria. The Enclosure Building's safety function to control the release of radioactive material could therefore not be assured. Dominion determined that the cause of the failure was eight MSSV exhaust pipe bushings not being seated properly because they had become stuck on the exhaust pipe. Dominion performed cleaning and lubrication of the MSSV exhaust pipe and performed a successful retest on April 26, 2011. The Enclosure Building had also failed its surveillance test in July 2009 when two MSSV bushings had not seated. The 2009 investigation determined that the lifting of the relief valves associated with these bushings as a result of the July 3, 2009 trip had caused the bushings to slide up the exhaust pipe and become stuck. The bushings were reseated and a successful retest was performed.

One of the corrective actions from the 2009 root cause was to develop a new procedure for the inspection and cleaning of the sliding bushings. Details were to include lifting of the bushing, and to provide necessary tooling and criteria for clearances and cleanliness. Procedure MP2702F10A, "Cleaning and Inspection of MSSVs Sliding Bushings," was approved in November 2009. However, the work performed on the bushings was completed in October 2009, which occurred prior to the approval of procedure MP2702F10A. As a result, the work orders for the sixteen sliding bushings did not contain details for properly cleaning the bushings. The work orders only stated, "verify that the sliding bushing is free to slide on vent stack without excessive binding in

Enclosure

accordance with MF 2701J-114." For the eight bushings that were not seated, only three of the work orders' comments stated that cleaning of the sliding bushing was performed. Dominion's apparent cause evaluation from the April 2011 failure stated that a contributing cause was, "ineffective implementation of corrective actions from root cause RCE000984; inadequate/inconsistent maintenance cleaning approach may have resulted in MSSV sliding bushings hanging up."

Analysis: The inspectors determined the failure to take prompt corrective action to clean the sliding bushings in October 2009 was a performance deficiency that was reasonably within Dominion's ability to foresee and correct, and should have been prevented. Traditional enforcement does not apply since there were no actual safety consequences, impacts on the NRC's ability to perform its regulatory function, or willful aspects of the finding.

The finding was more than minor because it was associated with the Procedure Quality attribute of the Barrier Integrity cornerstone and affected the cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, the failure of the MSSV sliding bushings to seat properly caused the EBFS to fail its surveillance test, and its safety function to control the release of radioactive material could not be assured. The inspectors conducted a Phase 1 screening in accordance with NRC Inspection Manual Chapter (IMC) Attachment 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," and determined that the finding was of very low safety significance (Green) because it only represents a degradation of the radiological barrier function provided for the auxiliary building.

The inspectors determined that this finding had a cross-cutting aspect in the Problem Identification and Resolution cross-cutting area, Corrective Action Program component, because Dominion did not take appropriate or timely corrective action to address the Enclosure Building surveillance test failure in 2009. [P.1(d)]

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," states, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, and defective material and equipment, and non-conformances are promptly identified and corrected. Contrary to the above, from October 2009 until April 2011, Dominion failed to take prompt corrective action to address the cause of the MSSV exhaust pipe bushings not seating properly, which caused the inoperability of the Enclosure Building and a loss of its safety function on April 3, 2011. Dominion took corrective action to clean and lubricate the MSSV exhaust pipe and also implemented a modification to upgrade the MSSV outlet boot and qualify it as part of the Enclosure Building filtration boundary. Because this violation was of very low safety significance and was entered into Dominion's CAP (CR420485), this violation is being treated as an NCV, consistent with the NRC's Enforcement Policy. **(NCV 0500336/2011003-03 Inadequate Corrective Action Results in Loss of Enclosure Building's Safety Function.)**

## .2 Automatic Reactor Trip Due to Loss of Feedwater Flow

### a. Inspection Scope

On June 20, 2011, at 11:52 a.m., Unit 2 experienced an automatic trip on low steam generator level. The low steam generator level was caused by a loss of feedwater flow when the 'B' steam generator feedwater pump (SGFP) tripped on low suction pressure while the operators were in the process of bringing the 'A' SGFP on-line.

The inspectors responded to the control room and evaluated the adequacy of operator actions in accordance with approved procedures and TS requirements. The inspectors performed a walkdown of the control room and interviewed personnel to verify that the plant was stable. The inspectors also reviewed the sequence of events and post trip review report in order to determine if there were any other plant or equipment anomalies.

The inspectors observed the reactor startup and portions of the power ascension including the starting of the second SGFP. The inspectors reviewed CRs to ensure conditions adverse to quality associated with this event were entered into Dominion's corrective action program for resolution.

### b. Findings

Introduction: A self-revealing finding (FIN) of very low safety significance (Green) was identified for Dominion's failure to follow procedure OP 2204, "Load Changes," when starting the 'A' SGFP. Specifically, the operating crew failed to maintain adequate SGFP suction pressure (greater than 325 psig) while starting the 'A' SGFP, which led to a trip of the 'B' SGFP and subsequent reactor trip on low steam generator level.

Description: On June 20, 2011, Millstone Unit 2 reduced power to 30 percent to repair an oil leak on the 'C' reactor coolant pump (RCP) motor. Following the repairs, Millstone Unit 2 began increasing power to 59 percent with the 'B' SGFP feeding the steam generators. Operators were in the process of bringing the 'A' SGFP pump on-line when feed regulating valve (FRV) differential pressure (dp) decreased outside of the operating band. The operator then incorrectly lowered 'B' SGFP speed to increase FRV dp. The operator did not get the desired response, and increased 'B' SGFP speed back to its original value. The operator then increased the speed of the 'A' SGFP in order to bring the pump on-line to feed the steam generators. This action decreased feed pump suction pressure and caused the 'B' SGFP to trip on low suction pressure. The resulting loss of feedwater flow caused a reactor trip on low steam generator level at 11:52 a.m.

Dominion's post trip review identified some instances where operator actions were not as expected. OP 2204, "Load Changes", step 4.1.21 states, "When placing the second SGFP in service, THROTTLE open CNM-2, "COND DEMIN BYP," as needed to maintain both SGFP suction pressures greater than 325 psig (C-05)." CNM-2 was not throttled open by the operating crew and SGFP suction pressure was not maintained above 325 psig, nor was it adequately monitored. SGFP suction pressure dropped below 325 psig at 11:44 a.m., and at 11:50 a.m. the 'B' SGFP suction pressure low

Enclosure

alarm came in at 260 psig on the plant process computer (PPC). The operating crew took no corrective action in response to the alarm.

In addition, the post trip review also identified that recent revisions to procedure OP 2204, which delayed the start of the heater drain pumps until 70 percent reactor power and increased the reactor power band for starting a second SGFP from 45 percent – 50 percent to 45 percent – 65 percent, may not have been appropriate.

The inspectors noted that OP 2321, "Main Feedwater System," which contains the procedure for starting a second SGFP, does not mention monitoring SGFP suction pressure. It only states in the initial steps, "Verify the following: Condensate header pressure greater than 425 psig (C-05)." The inspectors also noted that JITT for the power ascension did not include starting the second SGFP, because other power ascension evolutions, such as synchronizing to the grid, were deemed to be more difficult.

Analysis: The inspectors determined the failure to adequately monitor and take corrective action when SGFP suction pressure dropped below 325 psig was a performance deficiency that was reasonably within Dominion's ability to foresee and correct, and should have been prevented. Traditional enforcement does not apply since there were no actual safety consequences, impacts on the NRC's ability to perform its regulatory function, or willful aspects of the finding.

The finding is more than minor because it is similar to NRC Inspection Manual Chapter 0612, Appendix E, "Examples of Minor Issues," Example 4b; in that, a failure to follow procedure led to a reactor trip. This issue is associated with the Human Performance attribute of the Initiating Events cornerstone and affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the failure of the operators to properly monitor SGFP suction pressure led to a loss of adequate feedwater flow and a reactor trip. The inspectors conducted a Phase 1 screening in accordance with NRC Inspection Manual Chapter (IMC) Attachment 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," and determined that the finding was of very low safety significance (Green) because it did not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions would not be available.

The inspectors determined that this finding had a cross-cutting aspect in the Human Performance cross-cutting area, Work Practices component, because Dominion personnel did not properly follow the load changes procedure. [H.4(b)]

Enforcement: This finding does not involve enforcement action because no regulatory requirement violation was identified. Dominion entered this issue into their corrective action program (CR431574); conducted training exercises emphasizing safe operating envelopes, critical parameters to monitor, and actions to take to restore margin if plant conditions degrade; and has revised procedure OP 2204. Because this finding does not involve a violation of regulatory requirements and has very low safety significance, it is

Enclosure

identified as a finding. **(FIN 05000336/2011003-04 Failure to Follow Procedure for Starting a Second SGFP Results in Reactor Trip)**

#### 4OA5 Other Activities

.1 (Closed) NRC Temporary Instruction 2515/183, "Followup to the Fukushima Daiichi Nuclear Station Fuel Damage Event"

The inspectors assessed the activities and actions taken by the licensee to assess its readiness to respond to an event similar to the Fukushima Daiichi nuclear plant fuel damage event. This included (1) an assessment of the licensee's capability to mitigate conditions that may result from beyond design basis events, with a particular emphasis on strategies related to the spent fuel pool, as required by NRC Security Order Section B.5.b issued February 25, 2002, as committed to in severe accident management guidelines, and as required by 10 CFR 50.54(hh); (2) an assessment of the licensee's capability to mitigate station blackout (SBO) conditions, as required by 10 CFR 50.63 and station design bases; (3) an assessment of the licensee's capability to mitigate internal and external flooding events, as required by station design bases; and (4) an assessment of the thoroughness of the walkdowns and inspections of important equipment needed to mitigate fire and flood events, which were performed by the licensee to identify any potential loss of function of this equipment during seismic events possible for the site.

Inspection Report 05000245,336,423/2011009 (ML111320660) documented detailed results of this inspection activity.

.2 (Closed) NRC Temporary Instruction 2515/184, "Availability and Readiness Inspection of Severe Accident Management Guidelines (SAMGs)"

On May 13, 2011, the inspectors completed a review of the licensee's severe accident management guidelines (SAMGs), implemented as a voluntary industry initiative in the 1990's, to determine (1) whether the SAMGs were available and updated, (2) whether the licensee had procedures and processes in place to control and update its SAMGs, (3) the nature and extent of the licensee's training of personnel on the use of SAMGs, and (4) licensee personnel's familiarity with SAMG implementation.

The results of this review were provided to the NRC task force chartered by the Executive Director for Operations to conduct a near-term evaluation of the need for agency actions following the Fukushima Daiichi fuel damage event in Japan. Plant-specific results for Millstone Power Station were provided in an Attachment to a memorandum to the Chief, Reactor Inspection Branch, Division of Inspection and Regional Support, dated May 27, 2011 (ML111470361).

Enclosure

4OA6 Meetings, including Exit

Exit Meeting Summary

On August 1, 2011, the resident inspectors presented the overall inspection results to Mr. A. J. Jordan and members of his staff. The inspectors confirmed that no proprietary information was provided or examined during the inspection.

ATTACHMENT: SUPPLEMENTAL INFORMATION

Enclosure

**SUPPLEMENTAL INFORMATION****KEY POINTS OF CONTACT****Dominion personnel**

R. Arquaro	U3 Shift Manager
L. Armstrong	Manager, Training
G. Auria	Nuclear Chemistry Supervisor
B. Barron	Manager, Nuclear Oversight
B. Bartron	Supervisor, Licensing
C. Chapin	Assistant Operations Manager
W. Chestnut	Supervisor, Nuclear Shift Operations Unit 2
F. Cietek	Nuclear Engineer, PRA
T. Cleary	Licensing Engineer
G. Closius	Licensing Engineer
L. Crone	Supervisor, Nuclear Chemistry
J. Curling	Manager, Protection Services
J. Dorosky	Health Physicist III
M. Finnegan	Supervisor, Health Physics, ISFSI
J. Gauvin	Unit 3 Chemistry Technician
A. Gharakhanian	Nuclear Engineer III
M. Gobeli	Shift Technical Advisor
W. Gorman	Supervisor, Instrumentation & Control
J. Grogan	Assistant Operations Manager
K. Grover	Manager, Nuclear Operations
C. Houska	I&C Technician
A. Jordan	Site Vice President
J. Kunze	Supervisor, Nuclear Operations Support
J. Laine	Manager, Radiation Protection/Chemistry
R. MacManus	Director, Nuclear Station Safety & Licensing
G. Marshall	Manager, Outage and Planning
M. Martel	U3 Shift Manager
C. Rheims	I&C Engineer
R. Riley	Supervisor, Nuclear Shift Operations Unit 3
M. Roche	Senior Nuclear Chemistry Technician
L. Salyards	Licensing, Nuclear Technology Specialist
M. Sartain	Director, Nuclear Engineering
J. Semancik	Plant Manager
A. Smith	Asset Management
D. Smith	Manager, Emergency Preparedness
S. Smith	Manager, Engineering
J. Stoddard	Unit 3 Shift Manager
R. Sturgis	Secondary Systems Engineering Supervisor
M. Socha	Unit 3 Work Control SRO
S. Turowski	Supervisor, Health Physics Technical Services
C. Vournazos	IT Specialist, Meteorological Data
P. Zahn	Operations Support Specialist

**LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**Opened and Closed

05000423/2011003-01	NCV	Failure to Take Timely Corrective Actions for De-alloying of Aluminum Bronze Service Water Valves (Section 1R15)
05000336/2011003-02	NCV	Untimely Corrective Action for Safety Related Inverters Leads to Repetitive Out of Calibration Results (Section 1R22)
05000336/2011003-03	NCV	Inadequate Corrective Action Results in Loss of Enclosure Building's Safety Function (Section 4OA3)
05000336/2011003-04	FIN	Failure to Follow Procedure for Starting a Second SGFP Results in Reactor Trip (Section 4OA3)

Closed

05000336/2011-001	LER	Enclosure Building Rendered Inoperable Due to Dislodged Bushings
05000245,336,423/2515/183	TI	Follow-up to the Fukushima Daiichi Nuclear Station Fuel Damage Event (Section 4OA5.1)
05000336,423/2515/184	TI	Availability and Readiness Inspection of Severe Accident Management Guidelines (Section 4OA5.2)

## LIST OF DOCUMENTS REVIEWED

### **Section 1R01: Adverse Weather Protection**

AOP 2560, "Storms, High Winds and High Tides," Revision 010-05  
 AOP 3569, "Severe Weather Conditions," Revision 016-00  
 C OP 200.8, "Response to ISO New England/CONVEX Notifications and Alerts," Revision 004-05  
 ISO New England OP 4, "Action during a Capacity Deficiency," Revision 10  
 ISO New England M/LCC 5, "Procedure for Millstone Point Station Generation Reduction," Revision 10  
 SP 2665, "Building Flood Gate Inspections," Revision 005-02  
 System Health Report, NSST, RSST and Main Transformer, 1<sup>st</sup> Quarter 2011  
 System Health Report, 345KV Switchyard, 1<sup>st</sup> Quarter 2011  
 System Health Report, Unit 2 and Unit 3 Doors and Barriers, 1<sup>st</sup> Quarter 2011  
 M2 99 13754  
 53102268158 53102410975  
 53102355714 53102410976  
 53102410971 53102410977  
 53102410973  
 CR381899 CR412032  
 CR381901 CR412033  
 CR412022 CR412035  
 CR412023 CR412036  
 CR412024 CR420060  
 CR412026 CR420238  
 CR412028 CR420239  
 CR420495

### **Section 1R04: Equipment Alignment**

ACE 18611, "Failure of SP2609E for Facility 1 on April 3, 2011"  
 Maintenance Rule Scoping Tables for Enclosure Building Filtration  
 OP 2301B, "SDC/SFPC Core Off-Loaded," Revision 000-05  
 OP 2308-002, "HPSI System Valve Alignment, Facility 2," Revision 000-04  
 OP 2314G-001, "Enclosure Building Filtration System Alignment," Revision 012-01  
 OP 3308, "Train 'A' High Pressure Safety Injection," Revision 004-06  
 System Health Report Enclosure Building Filtration, 1<sup>st</sup> quarter 2011  
 25203-26028 Sheet 5, "Piping and Instrumentation Diagram Containment and Enclosure Building Ventilation," Revision 36  
 26203-26015 Sheet 1, "Piping & Instrumentation Diagram L.P. Safety Injection System," Revision 37  
 26203-26023 Sheet 2, "Piping & Instrumentation Diagram Spent Fuel Pool Cooling & Cleanup System," Revision 30  
 MRE010817 MRE010952  
 MRE010866 MRE011396  
 MRE010875 MRE011510  
 MRE010883 MRE013253  
 MRE010886 MRE013468

MRE013497  
MRE013505  
MRE013571

MRE013572  
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**Section 1R05: Fire Protection**

U2-24-FPP-FHA, "Millstone Unit 2, Fire Hazards Analysis," Revision 11  
Millstone Unit 2 Firefighting Strategies, April 2002  
Brigade Drill and Assessment for Unit 2 East Cable Vault

**Section 1R08: In-Service Inspection**

**Miscellaneous**

Aveva, NP, Inc. Engineering Information Record, No. 51-9152116-000, "Millstone Unit 2 – 2R20  
ECT Inspection Plan  
M2-EV-11-001, Revision 0, "Millstone Unit 2 Steam Generator Integrity Degradation  
Assessment (2R20)"

**Welding Package**

SA-AA-123, Revision 0, "Safety Requirements for Welding, Cutting and Brazing"  
WO 53102382555, "SWLB – Modification of Service Water Spt 60469 – DM2-00, 01-0132/10  
CMP 701.01, Revision 002-04, "Pre-Job Checklist"  
SA-AA-110, Attachment 2, "Job Hazard Assessment"  
WM-AA-301, Attachment 14, "High Contingency Plan Actions"

**Procedures**

ER-AA-NDE-UT-701, Revision 4, "Ultrasonic Thickness Measurement Procedure"  
CM-AA-FPA-101, Revision 3, "Control of Combustible and Flammable Materials"  
ER-AA-RRM-100, Revision 2, "ASME Section XI Repair/Replacement Program Fleet  
Implementation Requirements"  
ER-AA-NDE-VT-603, Revision 3, "VT-3 Visual Examination Procedure"  
MA-AA-101, Revision 5, "Fleet Lifting and Material Handling"  
MA-AA-1001, Revision 4, "Supplemental Personnel"  
MP-VE-9, Revision 001, "Visual Weld Acceptance Criteria for Weldments and Brazed  
Joints"  
SA-AA-107, Revision 0, "Fall Protection"  
SA-AA-108, Revision 0, "Hand and Portable Power Tool Safety"  
SA-AA-111, Revision 0, "Ladder Safety"  
SA-AA-118, Revision 2, "Personal Protective Equipment"  
SA-AA-119, Revision 2, "Safety Signs and Barriers"  
SA-AA-123, Revision 0, "Welding, Cutting, and Brazing Safety"

**Drawings**

252003-22200, SH 60469G

**Section 1R11: Licensed Operator Regualification Program**

MP2 ES11301A, "Evaluated Simulator Exam"  
LORT SE 16, Revision 4

**Section 1R12: Maintenance Effectiveness**

Apparent Cause of Failure Report, 'C' Charging Pump Motor, Electric Motor & Contracting Co., Inc.

Maintenance Rule Scoping Tables, Charging, Letdown and Boric Acid

System Health Report, Charging, Letdown and Boric Acid, 1<sup>st</sup> Quarter 2010 and 1<sup>st</sup> quarter 2011

MRE010523	MRE011217
MRE010817	MRE011377
MRE010827	MRE012159
MRE010852	MRE012314
MRE010911	MRE012382
MRE010912	MRE012902
MRE010933	MRE013587
MRE010954	MRE013664
MRE011216	MRE013670

**Section 1R13: Maintenance Risk Assessments and Emergent Work Control**

Alternate Plant Configuration Sheet for shutting 2-RC-252, pressurizer spray line isolation ETE-MP-2011-0090, "Structural Integrity Evaluation for MPS3 Dealloyed Aluminum Bronze Valves," Revision 0, dated May 26, 2011

Millstone Unit 2 & Millstone Unit 3, 2R20 Switchyard Work Risk Management Plan, Revision 1, March 31, 2011

Millstone Unit 2 Shutdown Safety Assessment (SSA) Checklist April 5, 2011, April 7, 2011

Millstone Unit 2 High Risk Evolution Plan for the 1<sup>st</sup> Reduction in RCS Inventory

Millstone Unit 3 EOOS Operator's Risk Report, April 14, 2011

OP-AA-1500, "Operational Configuration Control," Revision 5

OP 2301E, "Draining the RCS (ICCE)," Revision 024-07

OU-AA-200, "Shutdown Risk Management," Revision 2

OU-M2-201, "Shutdown Safety Assessment Checklist," Revision 1

Pre-2R20 Shutdown Risk Schedule Review

Shutdown Risk Contingency Plan Replacement of 2-SW-97B – Orange

SP 3446B12, "Train 'B' Solid State Protection System Operational Test," Revision 012-04

ESI-TP-3 96000049, "345 KV System," Revision 1

CR421347

CR422907

CR422915

CR428600

CR428654

CR428658

WO 53102440496

WO 53102273422

**Section 1R15: Operability Evaluations**

AOP-3555, "Reactor Coolant System Leak," Revision 017-02

EOP-3505, "Loss of Shutdown Cooling and/or RCS Inventory," Revision 10-03

EOP-ECA-1.2, "LOCA Outside of Containment," Revision 008

RAS 000176, "Justification for TCOA to Secure RCPs," Revision 0 dated April 4, 2011

NRC Memo from John Hannon to Sunil Weerakkody, "Subject: Resolution of Questions

Attachment

concerning Compliance with Section III.L.2 of Appendix 'R' dated February 10, 2005  
 ETE-MP-2011-0090, "Structural Integrity Evaluation for Millstone Unit 3 Dealloyed Aluminum  
 Bronze Valves," Revision 0 dated May 26, 2011  
 IOD000173, "Millstone Unit 3 Service Water Valves Dealloying Condition," dated May 28, 2011  
 CR419723, "Fire Shutdown Analysis Time Critical Operator Action (TCOA) to secure RCPs"  
 dated March 28, 2011  
 CR428600  
 CR428654  
 CR428658

### **Section 1R18: Plant Modifications**

25203-20097, "Main Steam Safety Valve Vent Piping," Revision 4  
 25203-20150, "Main Steam Relief Valve Discharge to Atmosphere," Revision 9  
 53102364164  
 53102364165  
 53102364166  
 53102364169  
 53102379998

### **Section 1R19: Post Maintenance Testing**

C SP 750-002, "Unit 2-Battery Quarterly Inspection," Revision 001-04  
 OP 2346C-002, "'B' DG Data Sheet," Revision 001-06  
 SP 2411A, "CEA Motion Inhibit Verification (deviation)," Revision 002-04  
 SP 2411B, "PDIL Alarm Verification," Revision 000-04  
 SP 2613J-001, "'B' Emergency DG Loss of Load Test," Revision 003  
 SP 2613L-001, "Periodic DG Slow start Operability Test, Facility 2 (Loaded Run)," Revision 003-  
 07  

53M20300833	53102389917
53M20807099	53102394659
53102283860	53102435234
53102301088	53102447327
53102322778	
	CR432184
CR420696	CR432201
CR422697	CR432228
CR422840	CR432400
CR432098	CR432419

### **Section 1R20: Refueling and Other Outage Activities**

EN 21004E, "ITC Measurements," Revision 006-06  
 EN 21004K, "Low Power Physics Test," Revision 003-00  
 MP 2712B1, "Control of Heavy Loads," Revision 010-06  
 MP 2704AA, "Unit 2 Reactor Disassembly and Reassembly," Revision 002-03  
 OP 2202A, "Reactor Startup by Dilution ICCE," Revision 000-04  
 OPS-FH 215, "Refueling Machine Operation," Revision 001-03  
 SP 21018-001, "Core Reactivity Balance Surveillance Form," Revision 010-02

CR420439  
CR421265  
CR423437  
CR424910

CR424939  
CR425314  
CR425513

**Section 1R22: Surveillance Testing**

SP 3622.3, "TDAFW Pump Operational Readiness and Quarterly IST Group 'B' Pump Tests,"  
Revision 017-03

SP 3622.3-001, Surveillance Form Revision 014-03

SP 3556B12, "SSPS Train 'B' Operational Test," Revision 012-04

CR412930, "Chemistry procedure needs enhancement"

Millstone Nuclear Power Station Gamma Spectrum Analysis dated May 27, 2011

CP 3802E, "Reactor Coolant gas Sampling and Analysis," Revision 002-01

53102294614

53102299983

53102296198

53102300352

CR422915

CR420164

CR425958

CR422421

CR426589

CR422847

CR426592

CR422907

**Section 2RS01/2RS02/2RS03/2RS04/2RS05/2RS06: Radiological Hazard Assessment and Exposure Control, Occupational ALARA Planning and Controls, In-Plant Airborne Radioactivity Control and Mitigation, Occupational Dose Assessment, Radiation Monitoring Instrumentation, Radioactive Gaseous and Liquid Effluent Treatment**

**Procedures**

SP 2815, Main Station Stack WRGM Sampling for Iodine and Particulates

SP 2814A, Gaseous Effluents for Iodines and Particulates from Unit 2 Vent

SP 3878, Unit 3 Monthly Liquid and Gaseous Effluent Dose Projection

SP 2858, Offsite Dose Noble Gases from Unit 2

SP 2859, Off-Site Dose-Iodine and Particulate Releases

RP-AA-502, Groundwater Protection Program

RP-AA-504, Remediation Process for the Groundwater Protection Program

RP-AA-524, Performing Source Term Estimates and Dose Calculations for Carbon-14 Effluents

RPM 2.8.5, Sampling and Disposal of Unit 3 Waste Test Tank Berm Water

EN 21235, Millstone Unit 2 Radiation Monitor High Radiation Setpoints

EN31153, Millstone Unit 3 Radiation Monitor High Radiation Setpoints

EP-AA-303, Equipment Important to Emergency Response

CY-AA-LQC-400-1000, Confirmatory Measurements Using Blind Samples

SP 3880, Unit 3 SCLRS Vent Radiation Monitor Inoperable

**Radiological Hazard Assessment (71124.01)**

RPM 1.5.2, Revision 4, High Radiation Area Key Control

RPM 1.5.5, Revision 4, Guidelines for Performance of Radiological Surveys

RPM 1.5.6, Revision 3, Survey Documentation and Disposition

RPM 2.1.1, Revision 5, Issuance and Control of RWPs

RPM 2.4.1, Revision 6, Posting of Radiological Control Areas

RPM 2.5.2, Revision 2, Guidelines for Spent Fuel Pool or Flooded Reactor Cavity Work  
RPM 5.2.2, Revision 10, Basic Radiation Worker Responsibilities  
RPM-GDL-008, Revision 0, Electronic Dosimeter Alarm Set Points  
RP-AA-201, Revision 4, Access Controls for High and Very High Radiation Areas  
RP-AA-106, Revision 1, Radiological Work Control Program  
RP-AA-124, Revision 2, Dosimetry Discrepancy and ED Alarm  
RP-AA-201, Revision 5, Access Controls for High and Very High Radiation Areas  
RP-AA-203, Revision 0, Radiological Labeling and Marking  
RP-AA-222, Revision 0, Radiation Surveys  
RP-AA-223, Revision 1, Contamination Surveys

ALARA Planning & Controls (71124.02)

RP-AA-103, Revision 0, ALARA Program  
RP-AA-103-1000, Revision 1, Station ALARA Committee  
RP-AA-300, Revision 4, ALARA Reviews and Reports  
RPM 1.4.2, Revision 2, ALARA Engineering Controls  
RPM 1.4.4, Revision 2, Temporary Shielding  
RPM 2.1.2, Revision 2, ALARA Interface with the RWP Process  
RPM 5.2.3, Revision 3, ALARA Program and Policy

In-Plant Airborne Radioactivity Control and Mitigation (71124.03)

RPM 2.4.3, Revision 5, DOP Testing of Portable HEPA Filtered Ventilation and Vacuum Units  
RPM 2.10.2, Revision 11, Air Sample Counting and Analysis

Calibration/Source/Functional Testing Records Reviewed:

In-Plant Effluent Monitors

Unit 2

Containment Gaseous and Particulate Process Radiation Monitor (RM-8123)  
Aerated Liquid Rad Waste Process Radiation Monitor (RM-9116)  
Waste Gas Process Radiation Monitor (RM-9095)  
Reactor Building Closed Cooling Water Radiation Monitor (RM-6038)  
Clean Liquid Rad Waste Process Radiation Monitor (RM-9049)

Unit 3

Containment Area High Range Radiation Monitor (3RMS\*RIY05A)  
Waste Neutralization Sump Radiation Monitor (3CND-RIY07)  
Ventilation Vent Stack High Range Radiation Monitor (3HVR\*RIY10A)  
Ventilation Vent Stack Normal Range Radiation Monitor (3HVR\*RIY10B)  
Supplemental Leak Collection and Release System High Range Radiation Monitor (3HVR\*RIY19A)  
Liquid Waste Radiation Monitor (3LWS-RIY70)  
Turbine Building Floor Drains Radiation Monitor (3DAS-RIY50)

Air Cleaning System Testing

SP 3614A, Unit 3 Auxiliary Building Ventilation System Surveillance Tests  
SP 3614I, Unit 3 Supplemental Leak Collection and Release System Surveillance Tests  
SP 2654Q, Unit 2 Containment and Enclosure Building Exhaust Filter L-25 HEPA  
Filtration Testing  
SP 2609D, Unit 2 Enclosure Building Charcoal/HEPA Filtration Testing  
SP 3449B, SLCRS Gaseous Radiation Monitor and Ventilation Vent Stack Calibration  
VPROC-OPS03-001, In-Place Testing of HEPA Filters & Charcoal Absorbers

Other Documents

Monthly, Quarterly, and Annual Liquid and Gaseous Effluent Dose Assessments for  
Unit 2 and Unit 3 from April 2010 through April 2011  
2010 Radioactive Effluent Release Report  
MP-22-REC-BAP01, Revision 26, Radiological Effluent Monitoring and Off-Site Dose  
Calculation Manual  
Audit 09-15, Off-Site Dose Calculation Manual/Radiological Environmental Monitoring  
Program (REMODOCM)

Occupational Dose Assessment (71124.04)

RPM 1.3.8, Revision 8, Criteria for Dosimetry Issue  
RPM 1.3.12, Revision 8, Internal Monitoring Program  
RPM 1.3.13, Revision 8, Bioassay Sampling and Analysis  
RPM 1.3.14, Revision 7, Personnel Dose Calculations and Assessments  
RPM 1.6.4, Revision 3, Siemens Electronic Dosimetry System  
RPM 2.5.8, Revision 3, Stay Time Tracking and Multi-Badging for Special Work  
RP-AA-123, Revision 1, Effective Dose Equivalent  
RP-AA-150, Revision 1, TLD Performance Testing

Condition Reports

423674, 416492, 416953, 418801, 419290, 419879, 420476, 420959, 421000, 421056, 421115,  
421661, 421760, 421906, 421915, 422233, 422281, 422384, 422712, 428440, 417715, 420139,  
382107, 425848, 421522, 422894, 422553, 418694, 409791, 387731, 380555, 370396, 368894

Site ALARA Council Meeting Minutes

2R20 Planning Presentations for Operations & Local Leak Rate Testing, Decon, Shielding  
Installation & Removal, In-service Inspection, Steam Generator Corrective Maintenance (CM)  
and Preventative Maintenance (PM), Reactor Disassembly/Reassembly, Mechanical CMs &  
PMs, Instrumentation & Controls Tasks

Miscellaneous Documents

NVLAP Certification Records, Personnel Dosimetry Performance Testing  
Annual Review Report of the 2010 10 CFR Part 61 Radionuclide Analysis  
Electronic Dosimeter Dose/Dose Rate Alarm Reports, January 2011 – April 2011  
Top Ten Individual Exposure Records for 2011  
Portable HEPA Inventory & Test Records  
EPRI Standard Radiation Monitoring Program Data Summary for Unit 2 piping  
Unit 2 Reactor Coolant System 2R20 Clean Up Data  
Nuclear Oversight Field Observation 2R20 Snapshot Reports

2R20 ALARA Plans (AP)/ Work-In-Progress (WIP) Reviews

AP 2-11-01, Reactor Disassembly/Reassembly

AP 2-11-09, Steam Generator PMs & CMs

AP 2-11-13, Scaffolding Installation/Removal, Installation of Permanent Scaffolding

AP 2-11-14, Insulation Removal/Installation

AP 2-11-26, Radiation Protection Support Activities for 2R20

**Section 40A3: Event Follow-up**

ACE 18611, "2R20 Failure of SP 2609E for Facility 1 on April 3, 2011

MP 2701J-114, "Main Steam Safety Valve Discharge Piping," Revision 0

MP2702F10A, "Cleaning and Inspection of MSSVs Sliding Bushings," Revision 000

RCE000984, "Enclosure Building Filtration System (EBFS) Negative Pressure Test Failed

Acceptance Criteria

SP 2609E, "EBFS Negative Pressure Test," Revision 009-04

SP 2609EE-001, "EBFS Negative Pressure Test, Facility 1," Revision 008-03

SP 2609EE-002, "EBFS Negative Pressure Test, Facility 2," Revision 001-04

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## LIST OF ACRONYMS

AC	Alternating Current
ADAMS	Agencywide Documents Access and Management System
ALARA	As Low As Reasonably Achievable
AOP	Abnormal Operating Procedure
AP	ALARA Plans
ASME	American Society of Mechanical Engineers
CAP	Corrective Action Program
CEDE	Committed Effective Dose Equivalent
CFR	Code of Federal Regulations
CLB	Current Licensing Basis
CR	Condition Report
CVCS	Chemical and Volume Control System
CW	Circulating Water
DAC	Derived Air Concentration
DG	Diesel Generator
DNB	Departure from Nucleate Boiling
DNC	Dominion Nuclear Connecticut
DPW	Declared Pregnant Workers
DRP	Division of Reactor Projects
DRS	Division of Reactor Safety
ECCS	Emergency Core Cooling System
EDEX	External Effective Dose Equivalent
EDG	Emergency Diesel Generator
EBFS	Enclosure Building Filtration System
EP	Emergency Preparedness
ESAS	Engineered Safety-Feature Actuation System
ESF	Engineered Safety Feature
FSAR	Final Safety Analysis Report
HEPA	High Efficiency Particulate Air
HPSI	High Pressure Safety Injection
HRA	High Radiation Areas
ICI	Incore Instrument
I&C	Instrumentation and Control
IMC	Inspection Manual Chapter
IST	In-Service Testing
JITT	Just-in-time-training
LER	Licensee Event Reports
LHRA	Locked High Radiation Area
LPSI	Low Pressure Safety Injection
LOCA	Loss of Coolant Accident
MCC	Motor Control Center
mrem	millirem
MSSV	Main Steam Safety Valve
MWTH	Megawatts Thermal
NCV	Non-Cited Violation

NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
NVLAP	National Voluntary Laboratory Accreditation Program
OD	Operability Determinations
ODCM	Off-Site Dose Calculation Manual
OOS	Out Of Service
PARS	Publicly Available Records System
PI	Performance Indicator
PI&R	Problem Identification and Resolution
PM	Preventive Maintenance
PMT	Post Maintenance Testing
RBCCW	Reactor Building Closed Cooling Water
RCA	Radiologically Controlled Area
RCE	Root Cause Evaluation
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
REMODCM	Radiological Effluent Monitoring and Offsite Dose Calculation Manual
RWP	Radiological Work Permit
SAC	Site ALARA Council
SDC	Shutdown Cooling
SDP	Significance Determination Process
SG	Steam Generator
SGFP	Steam Generator Feedwater Pump
SLCRS	Supplemental Leak Collection and Release System
SP	Surveillance Procedures
SW	Service Water
TEDE	Total Effective Dose Equivalent
TLD	Thermoluminescent Dosimeter
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
UGS	Upper Guide Structure
VHRA	Very High Radiation Areas
WO	Work Order
WRGM	Wide Range Gas Monitor